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THE MEMPHIS DEPOT
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Screening Sites
Field Sampling Plan

for

Defense Distribution Depot Memphis

September 1995

Prepared for

U.S. Army Corps of Engineers
Huntsville Division

Prepared by

CH2M HILL

2567 Fairlane Drive
Montgomery, AL 36116

110479.SS.ZZ

September 29, 1995

DEFENSE LOGISTICS AGENCY
DEFENSE DISTRIBUTION DEPOT MEMPHIS
2163 AIRWAYS BLVD.
MEMPHIS, TENNESSEE 38114-5210

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October 12, 1995

IN REPLY
REFER TO DDMT-DE

SUBJECT: Final Screening Sites Field Sampling Plan

Mr. Joseph R. Franzmathes, Director
Waste Management Division
U.S. Environmental Protection Agency
345 Courtland St., NE
Atlanta, GA 30365

Dear Mr. Franzmathes:

I have enclosed four copies of the final Screening Sites Field Sampling Plan for Defense Distribution Depot Memphis. We have attempted to revise the previous draft of this document appropriately in response to your comments and those of the Tennessee Department of Environment and Conservation (TDEC). Please note that the revisions to the previous document are in the form of errata sheets. Directions for replacing pages are also enclosed.

Should you have any questions or require additional information, please contact me at 901-775-6372.

Frank Novitzki

FRANK NOVITZKI
DDMT Project Manager

cc:
TDEC (J. English)
ASCE-WP (M. Dobbs)
HSHB-ME-SR (D. Druck)
DDMT-D
CEHND-PM-MD (J. Romeo)
ME3 (S. Estes)

Executive Summary

Introduction

In October 1992, the Defense Depot Memphis, Tennessee (DDMT), was placed on the National Priorities List (NPL) by the U.S. Environmental Protection Agency (EPA). Therefore, DDMT must fulfill requirements under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Contingency Plan. A remedial investigation/feasibility study (RI/FS) will be conducted to determine the nature and extent of contamination, to evaluate the risk to human health and the environment, and to screen potential cleanup actions. The *Generic RI/FS Work Plan* was prepared to show how the investigation and study will be accomplished. The *Site Management Plan* (SMP) identified sites at the facility requiring investigation under CERCLA. When little information was known about a particular site, the site was designated for screening; that is, limited data collection was required to evaluate whether an RI was warranted. This *Screening Sites Field Sampling Plan* (SSFSP) was prepared for DDMT as a supplement to the *Generic RI/FS Work Plan*. The objective of the SSFSP is to present a detailed description of the proposed sampling and analysis activities that will be performed and to describe the rationale for investigation for each of the screening sites.

The ultimate goal of the RI/FS is to select cost-effective cleanup actions that provide protection of public health and the environment. To accomplish this goal, the nature and extent of the release of hazardous substances must be identified, the source of release must be determined, and proposed cleanup actions must be evaluated. By implementing the field investigation strategies described in the SSFSP, the quantity and quality of data collected will aid in achieving the goal of the RI/FS at DDMT.

Site Background and Location

DDMT receives, warehouses, and distributes supplies common to all U.S. military services and some civil agencies, located primarily in the southeastern United States, Puerto Rico, and the Panama area. The installation covers 642 acres of land in Memphis, Shelby County, Tennessee, in the extreme southwestern portion of the state. The installation contains approximately 110 buildings, 26 miles of railroad track, and 28 miles of paved streets. Approximately 5.5 million square ft of storage space is open. Stored items include food, clothing, electronic equipment, petroleum products, construction materials, and industrial, medical, and general supplies used by all military branches of the U.S. government.

Description of Operable Units

DDMT is divided into four operable units (OUs) for evaluation purposes. OU-1, north of the Main Installation, is called Dunn Field. The Main Installation is divided into three areas: the southwestern quadrant, OU-2; the southeastern quadrant, including Lake Danielson and the golf course area, OU-3; and the north-central area, OU-4. Sites identified in OU-1 for investigation resulted from use of the area for landfill operations, mineral stockpiles, pistol range use, and materials storage. Potential contamination of OU-2 may have resulted from spills or releases from the hazardous material storage and repouring area, sandblasting and painting activities, or both. Storage of polychlorinated biphenyls (PCBs) and the use of pesticides and herbicides are potential sources of contamination for OU-3. Principal contamination in OU-4 probably resulted from a wood treatment operation and hazardous material storage. The sites being investigated for screening purposes are located throughout the installation, in each OU.

Summary of SSFSP

This document describes the DDMT facility and individual screening site history and data gaps, locations, geography, surface water hydrology, geology, hydrogeology, land use, and screening site data needs. Additionally, this document describes the sampling strategy and sampling plan for each screening site. The purpose of this SSFSP is to identify whether past activities at each of the sites have resulted in releases from the site that would require further investigation.

Sampling Strategy

A cost-effective, quality sampling strategy has been developed to perform an RI/FS at DDMT. This SSFSP uses an observational approach to field data collection and making field-based decisions to achieve the goals of the facility. The approach is intended to support a recommendation of one of the following options for each screening site:

- Site upgrade (RI activities)
- Site downgrade (support No Further Action)
- Early removal action with confirmational sampling

Up to four levels of sampling data may be used at DDMT, because there is the potential for Level 4 data to be required in the future at this facility. Level 1 data provide the most rapid results and will generate environmental characteristics for the site. Level 2 data provide rapid results and limited information on contaminant specification, and can give quantitative results. However, the analytical detection limits for Level 2 data are higher than those of an analytical laboratory. Level 3 and 4 data are generated by an analytical laboratory that implements specified quality assurance/quality control methods. By implementing combinations of data at up to all four levels, cleanup decisions will be resolved expeditiously.

To support recommendations in a timely manner, soil and water samples will be collected at DDMT and analyzed using a fixed-based laboratory. Ten percent of the Level 2 samples will be sent to an offsite laboratory for Level 3 confirmational analysis. On the basis of Level 2 and Level 3 data, a comparison of regulatory levels and calculated risk levels of contamination will aid in supporting the appropriate recommendation.

Proposed Sampling

Surface and subsurface soil samples have been proposed for all screening sites. Soil borings will be installed surrounding and within the proposed site locations. Soil samples will be collected at regular intervals from each boring to assess the vertical extent of contamination. Surface soil samples will be collected and analyzed to assess the horizontal extent of contamination.

Surface water and sediment samples will be collected at screening sites where surface water is present. The samples will be analyzed to assess the potential for existing onsite and offsite contaminant migration.

A phased approach is being used to collect data at each screening site during a single field investigation. The primary field activities are proposed to identify whether a contaminant release has occurred. If the primary activities indicate that a release has occurred, the optional field activities will be conducted. The optional field activities include additional sample collection or early removal of a site. The primary data quality objectives of the optional activities would be to evaluate the nature and extent of contamination and to provide sufficient data to conduct a statistical-based comparison to risk-based contaminant levels. Data collected during these phased activities will also support the decision for early removal of a site.

By implementing this SSFSP, the RI/FS can be conducted in a cost-effective, timely manner. Additionally, quality data will be obtained that will aid in supporting an evaluation of remedial alternatives for the cleanup of screening sites at DDMT.

Because there is a potential that chemical warfare materials may be encountered during intrusive investigations at the western portion of Dunn Field, DDMT has requested assistance from the U.S. Army Corps of Engineers, Huntsville Division, Ordnance and Explosives Division, to prepare a site safety submission. This document is being prepared so that the investigation in the Dunn Field area will be performed safely and with appropriate engineering controls to protect onsite workers and nearby residents. Investigation activities presented in this Field Sampling Plan will not be performed until the site safety submission is approved by the Department of Health and Human Services.

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Acronyms

ARARs	Applicable or relevant and appropriate requirements
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
bgs	Below ground surface
BRA	Baseline risk assessment
BRAC	Base Realignment and Closure
CAIS	Chemical Agent Identification Set
CEHND	U.S. Army Corps of Engineers–Huntsville Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COE	U.S. Army Corps of Engineers
CWM	Chemical Warfare Materials
CWMP	Chemical Warfare Management Plan
DDHS	Department of Health and Human Services
DDMT	Defense Depot Memphis, Tennessee
DDT	Dichlorodiphenyltrichloroethane
DLA	Defense Logistics Agency
DQOs	Data quality objectives
DRMO	Defense Reutilization Marketing Office
EPA	U.S. Environmental Protection Agency
ER	Early Removal
ESE	Environmental Science & Engineering, Inc.
FBL	Fixed-based laboratory
FFA	Federal Facilities Agreement
FR	*Federal Register*
FRL	Final remediation level
FSP	Field Sampling Plan
ft	Feet
FTL	Field team leader
HASP	Generic Health and Safety Plan
HQ/HI	Hazard Quotient/Hazard Index
HRS	Hazard Ranking System
HTW	Hazardous and toxic waste
L/day	Liters per day
LOEL	Lowest observed effects level
MCL	Maximum contaminant level
MCLG	Maximum contaminant level goal
mg/L	Milligrams per liter
mL	Milliliter
MS/MSD	Matrix spike/matrix spike duplicate
MW	Monitoring well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NOAEL	No observed adverse effects level
NPL	National Priorities List

Acronyms (cont'd.)

OE	CEHND Ordnance and Explosives Division
OERR	Office of Enforcement and Remedial Response
OHM	O. H. Materials
OSWER	Office of Solid Waste and Emergency Response
OU	Operable unit
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCOC	Potential contaminant of concern
PCP	Pentachlorophenol
PEL	Permissible exposure level
PM	Project manager
POL	Petroleum, oil, and lubricants
ppb	Parts per billion
ppm	Parts per million
PPM	Priority pollutant metal
PRG	Preliminary remediation goal
QA/QC	Quality assurance/quality control
QAPP	Generic Quality Assurance Project Plan
RA	Remedial Action
RAGs	Risk Assessment Guidance for Superfund
RAL	Removal action level
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RFA	RCRA Facility Assessment
RGO	Remedial goal option
RI/FS WP	Generic RI/FS Work Plan
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of decision
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SMP	Site Management Plan
SS	Surface soil
SSFSP	Screening Sites Field Sampling Plan
STB	Stratigraphic test boring
SVOC	Semivolatile organic compound
SW	Surface water
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCL/TAL	Target compound list/target analyte list
TDEC	Tennessee Department of Environment and Conservation
TEU	U.S. Army Technical Escort Unit
THI	Target Hazard Index
TRL	Target Risk Level

UCL	Upper confidence limit
USACDRA	U.S. Army Chemical Demilitarization Activity
USAEHA	United States Army Environmental Hygiene Agency
UST	Underground storage tank
VOC	Volatile organic compound
ZnO	Zinc oxide

TAB

Section 1 Introduction

1.0 Introduction

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1.1 Goals and Objectives

The ultimate goal of the Remedial Investigation/Feasibility Study (RI/FS) is to select cost-effective cleanup actions that minimize threats and provide protection of public health and the environment. To accomplish this goal, the source of contaminant release must be identified, the extent of contamination must be evaluated, and proposed cleanup actions must be evaluated.

The objective of this *Screening Sites Field Sampling Plan* (SSFSP) is to present a description of the proposed sampling and analysis activities that will be performed and to describe the rationale for site investigation for each of the screening sites at the Defense Depot Memphis, Tennessee (DDMT).

The purpose of this effort is to identify whether past activities at each of the sites have resulted in releases from the site that would require further investigation. The SSFSP's intent is not to fully delineate the nature and extent of soil or groundwater contamination attributable to past operations, but to conduct technically based screening activities sufficient to identify the likelihood of contamination.

Once the sites have been screened using the techniques identified in this SSFSP, the data will be evaluated and used to make a decision about whether to upgrade the site to an RI site, to downgrade the site to a No Further Action (NFA) site, or to recommend a site for Early Removal (ER) evaluation. The screening sites in this document have been identified by DDMT through the review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. References used to develop the list of screening sites in conjunction with other records are listed in Appendix A.

1.2 Regulatory Requirements

DDMT was issued a Resource Conservation and Recovery Act (RCRA) Part B Permit (No. TN4 210 020 570) by the U.S. Environmental Protection Agency (EPA), Region IV, and the Tennessee Department of Environment and Conservation (TDEC) on September 28, 1990. Subsequently, in accordance with Section 120(d)(2) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9620(d)(2), EPA prepared a final Hazard Ranking System (HRS) Scoring Package for DDMT. On the basis of the final HRS score of 58.06, EPA added DDMT to the National Priorities List (NPL) by publication in the *Federal Register*, 199 FR 47180, on October 14, 1992. The RI investigation presented herein, and future investigations, are intended to satisfy the requirements of CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and the RCRA Part B permit.

DDMT has entered into a Federal Facilities Agreement (FFA) between the Defense Logistics Agency (DLA), EPA, and TDEC dated March 6, 1995. This agreement establishes a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at DDMT in accordance with existing regulations and for achieving RCRA/CERCLA integration. As a result of DDMT's status as an NPL site, it was agreed that the investigation of all applicable sites would proceed under the CERCLA process for remediation (RI, FS, proposed plan, record of decision, Remedial Design [RD], Remedial Action [RA], or NFA).

1.3 Facility and Site Status

As a result of the NPL status, the required site-specific investigations, and the FFA, the facility has been geographically delineated into four operable units (OUs). OU-specific Field Sampling Plans (FSPs) are being prepared for OUs-1, 2, 3, and 4. These OU-specific FSPs will provide guidelines for conducting the RI/FSs for each OU. The OU-specific plans will address sites that have been known to have past releases as a result of facility operations (RI sites). This SSFSP will address the needs for those sites that have not been upgraded to RI status because of limited analytical data. Schedules for completing specific tasks during the process have been submitted separately in the *Site Management Plan* (SMP).

DDMT is conducting the screening activities in conformance with the requirements of CERCLA and the FFA. In addition, elements of DDMT's RCRA permit dictate that DDMT undertake a study to confirm the absence or presence of contamination at locations where hazardous or toxic wastes were managed or disposed. This SSFSP concurrently addresses the sites that have been previously identified as requiring a screening. Table 1-1 presents a summary of all sites at DDMT. This table also identifies the disposition for each site. Table 1-1 was prepared from information contained in the *RCRA Facility Assessment* (RFA) (ref. 22), *RI Report* (ref. 4), FFA, *Chemical Warfare Archives Search* (ref. 41), and *Early Removal Memorandum* (ref. 40).

1.4 Elements of the Screening Sites Field Sampling Plan

This SSFSP is written as a supplement to the generic (facilitywide) work plans for DDMT. Details not included in this plan can be found in the generic work plans. These work plans were provided as separate documents and are listed below:

- *Generic RI/FS Work Plan* (RI/FS WP)
- *Generic Quality Assurance Project Plan* (QAPP)
- *Generic Health and Safety Plan* (HASP)

Table 1-1
CERCLA Site Status (February 21, 1995)
Defense Depot Memphis, Tennessee

Site Number	Operable Unit	Description	SWMU Number	LAW Number	RFA Status	Current Status
1	OU-1	Mustard and Lewisite Training Sets (6) Burial Site (1955)	1	1	PRFI	CWMP
9	OU-1	Ashes and Metal Burial Site (burning pit refuse) (1955)	9	10	PRFI	CWMP
24	OU-1	Former Burn Site (1946)	24	31	PRFI	CWMP
86	OU-1	Food Supplies (Dunn Field)	-	29	-	CWMP
2	OU-1	Ammonia Hydroxide (7 lbs) and Acetic Acid (1 gal.) Burial (1955)	2	2	PRFI	ER
3	OU-1	Mixed Chemical Burial Site (orthotoluidine dihydrochloride, 1955)	3	3	PRFI	ER
4	OU-1	POL Burial Site (13, 55-gal. drums of oil, grease, and paint: date unknown)	4	4	PRFI	ER
4.1	OU-1	POL Burial Site (32, 55-gal. drums of oil, grease, and thinner, 1955)	-	5	PRFI	ER
5	OU-1	Methyl Bromide Burial Site A (3 cubic feet) (1955)	5	6	PRFI	ER
7	OU-1	Nitric Acid Burial Site (1,700 bottles) (1954)	7	8	PRFI	ER
8	OU-1	Methyl Bromide Burial site B (3,768 - 1-gal. cans) (1954)	8	9	PRFI	ER
13	OU-1	Mixed Chemical Burial (Acid, 900 lbs., Deter., 7,000 lbs., AL2S04, and 200 lbs. Na)	13	13	PRFI	ER
17	OU-1	Mixed Chemical Burial Site C (1969)	17	17	PRFI	ER
85	OU-1	Old Pistol Range Bldg. 1184/Temporary Pesticide Storage	-	25	-	ER
18	OU-1	Plane Crash Residue (Dunn Field)	18	-	NFA	NFA
22	OU-1	Hardware Burial Site (Nuts and Bolts) (Dunn Field)	22	19	NFA	NFA
23	OU-1	Construction Debris and Food Burial Site (Dunn Field)	23	30	NFA	NFA
63	OU-1	Fluorspar Storage (Southeastern Quadrant of Dunn Field)	-	28	-	NFA
6	OU-1	40,037 units ointment (eye) Burial Site (1955)	6	7	PRFI	RI
10	OU-1	Solid Waste Burial Site (near MW-10) (metal, glass, trash, etc.)	10	74	PRFI	RI
14	OU-1	Municipal Waste Burial Site B (near MW-12) (food, paper products)	14	75	PRFI	RI
15	OU-1	Sodium Burial Sites (1968)	15	14	PRFI	RI
15.1	OU-1	Sodium Phosphate Burial (1968)	-	15	PRFI	RI
15.2	OU-1	14 Burial Pits: Na2PO4, Na, Acid, Medical Supplies, and Chlorinated Lime	-	33	PRFI	RI
19	OU-1	Former Tear Gas Canister Burn Site (Dunn Field)	19	21	PRFI	Screening
20	OU-1	Probable Asphalt Burial Site (Dunn Field)	20	20	PRFI	Screening
21	OU-1	XXCC-3 Burial Site (Dunn Field)	21	22	PRFI	Screening
50	OU-1	Dunn Field Northeastern Quadrant Drainage Ditch	AOC-A	23	PRFI	Screening
61	OU-1	Buried Drain Pipe (Northwestern Quadrant of Dunn Field)	-	26	-	Screening

Table 1-1
CERCLA Site Status (February 21, 1995)
Defense Depot Memphis, Tennessee

Site Number	Operable Unit	Description	SWMU Number	LAW Number	RFA Status	Current Status
62	OU-1	Bauxite Storage (Eastern Half Quadrant of Dunn Field)	-	27	-	Screening
64	OU-1	Bauxite Storage (Southwestern Quadrant of Dunn Field) (1942 through 1972)	-	32	-	Screening
30	OU-2	Paint Spray Booths (2 of 3 total; Bldgs. 770 and 1086)	30	-	NFA	NFA
40	OU-2	Safety Kleen Units - 5 of 9 total (all located in Bldg. 770)	40	-	NFA	NFA
41	OU-2	Satellite Drum Accumulation Areas - 2 of 4 total (vicinity of Bldg. 770)	41	-	NFA	NFA
47	OU-2	Former Cont. Soil Drum Storage Area (300 ft W of Bldg. 689, removed 1988)	47	-	NFA	NFA
11	OU-1	Trichloroacetic Acid Burial Site (1,433 - 1-oz bottles) (1965)	11	11	PRFI	ER
12	OU-1	Sulfuric and Hydrochloric Acid Burial (quantity?) (1967)	12	12	PRFI	ER
16	OU-1	Unknown Acid Burial Site (1969)	16	16	PRFI	ER
16.1	OU-1	Acid, date unknown	-	18	PRFI	ER
29	OU-2	Former Underground Waste Oil Storage Tank	29	66	PRFI	ER
60	OU-1	Pistol Range Impact Area/Bullet Shop	-	24	-	ER
87	OU-2	DDT, banned pesticides (Bldg. 1084)	-	64	-	ER
88	OU-2	POL (Bldg. 1085)	-	65	-	ER
27	OU-2	Former Recoup Area	27	60	RFI	RI
32	OU-2	Sandblasting Waste Accumulation Area	32	67	RFI	RI
34	OU-2	Building 770 Underground Oil Storage Tanks	34	58	PRFI	RI
89	OU-2	Acids (Bldg. 1089)	-	68	-	Screening
31	OU-2	Former Paint Spray Booth (Bldg. 1087)	31	-	PRFI	Screening
33	OU-2	Sandblasting Waste Drum Storage Area (Metal Shed S. of Bldg. 1088)	33	-	NFA	Screening
82	OU-2	Flammables (Bldg. 783)	-	59	-	Screening
84	OU-2	Flammables, Solvents, Waste Oil, etc. (Bldg. 972)	-	63	-	Screening
30	OU-3	Paint Spray Booths (1 of 3 total - Bldg. 260)	30	-	NFA	NFA
40	OU-3	Safety Kleen Units - 4 of 9 total units (Bldgs. 253, 469, 490, and 689)	40	-	NFA	NFA
41	OU-3	Satellite Drum Accumulation Areas - 2 of 4 total areas (Bldgs. 469 and 260)	41	-	NFA	NFA
49	OU-3	Medical Waste Storage Area	49	46	NFA	NFA
25	OU-3	Golf Course Pond	25	42	RFI	FS
26	OU-3	Lake Danielson	26	43	RFI	FS
73	OU-3	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	-	73	-	FS

Table 1-1
CERCLA Site Status (February 21, 1995)
Defense Depot Memphis, Tennessee

Site Number	Operable Unit	Description	SWMU Number	LAW Number	RFA Status	Current Status
48	OU-3	Former PCB Transformer Storage Area	48	39	PRFI	RI
58	OU-3	Pesticides, Herbicides (PAD 267)	-	38	-	RI
59	OU-3	Pesticides, Cleaners (Bldg. 273)	-	40	-	RI
51	OU-3	Lake Danielson Outlet Ditch	AOC-B	-	PRFI	Screening
52	OU-3	Golf Course Pond Outlet Ditch	AOC-C	-	PRFI	Screening
63	OU-3	XXCC-3 (Bldg. 249)	-	34	-	Screening
66	OU-3	POL (Bldg. 253)	-	35	-	Screening
67	OU-3	MOGAS (Bldg. 253)	-	36	-	Screening
68	OU-3	POL (Bldg. 263) (20 x 40 feet)	-	37	-	Screening
69	OU-3	2,4-D, M2A1, and M4 flamethrower liquid fuels (surface appl)	-	41	-	Screening
75	OU-3	Unknown Wastes near Bldg. 689	-	50	-	Screening
76	OU-3	Unknown Wastes near Bldg. 690	-	51	-	Screening
77	OU-3	Unknown Wastes near Bldgs. 689 and 690	-	52	-	Screening
78	OU-3	Alcohol, Acetone, Toluene, Naptha; Hydrofluoric Acid Spill	-	53	-	Screening
41	OU-4	Satellite Drum Accumulation Area (1 of 5 total - Bldg. 210)	41	-	NFA	NFA
44	OU-4	Former Wastewater Treatment Unit Area	44	56	NFA	NFA
45	OU-4	Former Contaminated Soil Staging Area	45	56	NFA	NFA
53	OU-4	X-25 Flammable Solvents Storage Area (near Bldg. 925)	AOC-D	61/62	NFA	NFA
57	OU-4	Building 629 Spill Area	AOC-H	49	RFI	RI
28	OU-4	Recoup Area Building	28	-	NFA	Screening
35	OU-4	DRMO Bldg T-308 Hazardous Waste Storage	35	46	NFA	Screening
36	OU-4	DRMO Hazardous Waste Concrete Storage Pad	36	-	NFA	Screening
37	OU-4	DRMO Hazardous Waste Gravel Storage Pad	37	-	PRFI	Screening
38	OU-4	DRMO Damaged/Empty Hazardous Materials Drum Storage Area	38	-	PRFI	Screening
39	OU-4	DRMO Damaged/Empty Lubricant Container Area	39	-	PRFI	Screening
42	OU-4	Former PCP Dip Vat Area	42	56	PRFI	Screening
43	OU-4	Former Underground PCP Tank Area	43	56	PRFI	Screening
46	OU-4	Former PCP Pallet Drying Area	46	56	PRFI	Screening
54	OU-4	Main Installation - DRMO East Storm Water Runoff Canal	AOC-E	-	NFA	Screening

Table 1-1
CERCLA Site Status (February 21, 1995)
Defense Depot Memphis, Tennessee

Site Number	Operable Unit	Description	SWMU Number	LAW Number	RFA Status	Current Status
55	OU-4	Main Installation - DRMO North Storm Water Runoff Area	AOC-F	-	NFA	Screening
56	OU-4	Main Installation - West Storm Water Drainage Canal	AOC-G	-	NFA	Screening
70	OU-4	POL, Various Chemicals (RR tracks 1, 2, 3, 4, 5, 6) - Leaks	-	70	-	Screening
71	OU-4	Herbicide (All RR tracks) (used to clear tracks)	-	71	-	Screening
72	OU-4	Waste Oil (PDO yard) (surf. appl. for dust control)	-	72	-	Screening
73	OU-4	2,4-Dichlorophenoxyacetic Acid (all grassed areas)	-	73	-	Screening
74	OU-4	Flammables, toxics (West End - Bldg. 319)	-	45	-	Screening
79	OU-4	Fuels, Misc. Liquids, Wood, Paper (Vicinity of S702)	-	54	-	Screening
80	OU-4	Fuel and cleaners dispensing (Bldg. 720)	-	55	-	Screening
81	OU-4	Fuel Oil (Bldg. 765)	-	57	-	Screening
83	OU-4	POL (isooctane, toluene, actone, MEK, naptha) Areas X-13, 15, 25	-	69	-	Screening

RFA-RCRA Facility Assessment
Law Number-Law Environmental RI SWMU identification number
NFA-No Further Action
PA/SI-Preliminary Assessment/Site Investigation
PRFI-Preliminary RCRA Facility Investigation
RFI-RCRA Facility Investigation
Screening-Screening Sites Field Sampling Plan
ER-Early Removal Site
FS-Feasibility Study
RI-Remedial Investigation Site
SWMU - Solid Waste Management Unit
CWMP - Chemical Warfare Management Plan

Site Summary: 13 NFA Sites (17 listings-same sites in multiple numbers (4))
44 Screening Sites (45 listings-same site in multiple OUs (1))
20 RI Sites
3 CWMP Sites
13 Early Removal Sites
93 Sites (5 sites in multiple OUs, 98 listings)

This SSFSP defines in detail the sampling and data-gathering methods that will be used. The structure of this document includes all known site conditions and history; proposed site-specific sampling, analysis, intended data use, and data quality level; and a discussion of required field actions that are not site-specific. Sample designation, sample equipment and procedures, and sample handling and analysis are addressed in the *QAPP* (ref. 31).

1.5 Chemical Warfare Investigation Requirements

Chemical warfare materials (CWM) have historically been disposed at the facility. There are four documented locations at Dunn Field where CWM have been disposed. The documented CWM sites of concern at Dunn Field are as follows:

- Mustard bomb decommissioning site (Site 24)
- Ashes and metals burial site (Site 9)
- Chemical Agent Identification Sets (CAISs) burial site (Site 1)
- Food burial site (reported to contain CAISs, Site 86)

As a result of the known CWM disposal at Dunn Field, the potential of encountering CWM in unknown locations, and the proximity to residences in the Dunn Field area, DDMT has requested assistance from agencies responsible for CWM activities. Three agencies are responsible for CWM investigation and disposition—the U.S. Army Corps of Engineers—Huntsville Division (CEHND), United States Army Chemical Demilitarization Activity (USACDRA), and the U.S. Army Technical Escort Unit (TEU).

The CEHND Ordnance and Explosives Division (OE) is responsible for conducting CWM investigations within the context of government requirements and safety requirements. In particular, the CEHND-OE is responsible during investigation and excavation of CWM sites. USACDRA is responsible for providing guidance on Interim Holding Plans and Transportation and Disposal Plans for CWM materials. The TEU is responsible for CWM assessment investigations, field CWM analytical procedures, packaging and transportation, and technical advice to CEHND.

These three agencies and DDMT have developed a strategy to evaluate the presence of CWM at the facility and to investigate sites at the facility where the potential for CWM exists. The strategy selected to accommodate both the CWM and the hazardous and toxic waste (HTW) components of the project includes a three-phased approach. All three phases are proposed to begin simultaneously as a result of schedule efficiency and the need for ultimate removal of the CWM sites as a result of the facility's Base Realignment and Closure (BRAC) status. These three phases are discussed below:

1. Conduct an initial investigation focused on the known CWM sites at the facility. The purpose of the investigation is to evaluate the presence of and to delineate the nature and extent of potential CWM contamination at Dunn Field. These activities will be conducted by CEHND-OE.

2. Prepare a Site Safety Submission for review by the Department of Health and Human Services (DHHS). The CEHND-OE Division will prepare the Site Safety Submission.

3. Conduct necessary CWM removal actions based on the results of the field investigations. Field monitoring and screening will be performed during the field activities and appropriate control measures will be implemented to minimize the occurrence of releases of CWM.

A key component to the removal actions will include field monitoring using quick turnaround methods for identifying contaminated media. These field activities also will be used during the HTW investigation to confirm that CWM are not present during the investigation at other non-CWM sites. Additionally, these monitoring activities will provide real-time results to monitor the health and safety of the workers and the nearby residences.

As a result of the known potential for encountering CWM during the intrusive sampling at Dunn Field, a strategy will be developed to investigate Dunn Field sites in a safe and effective manner. However, this SSFSP does not include all of the necessary components to conduct investigations in the potentially contaminated Dunn Field area (western half).

Before conducting any intrusive investigation in the western half of Dunn Field, the initial investigation must be completed by CEHND-OE, the Site Safety Submission must be approved, and the monitoring and analytical requirements for CWM monitoring must be provided. Investigations in the western half of Dunn Field are delayed until these tasks are completed. Investigations in the western half of Dunn Field will be performed using the monitoring and control procedures identified in the CWM Site Safety Submission.

TAB

Section 2 - Facility + Site Descriptions

2.0 Facility and Site Descriptions

2.1 Location

DDMT covers 642 acres of land in Memphis, Shelby County, Tennessee. Shelby County is located in the extreme southwestern portion of the state. DDMT is approximately 5 miles east of the Mississippi River and just northeast of the Interstate 240–Interstate 55 junction. DDMT is in the south-central section of Memphis, approximately 4 miles southeast of the central business district and 1 mile northwest of Memphis International Airport. Airways Boulevard borders it on the east and provides primary access to the installation. Dunn Avenue, Ball Road, and Perry Road serve as the northern, southern, and western boundaries, respectively. Figure 2-1 shows the installation's location within the Memphis area.

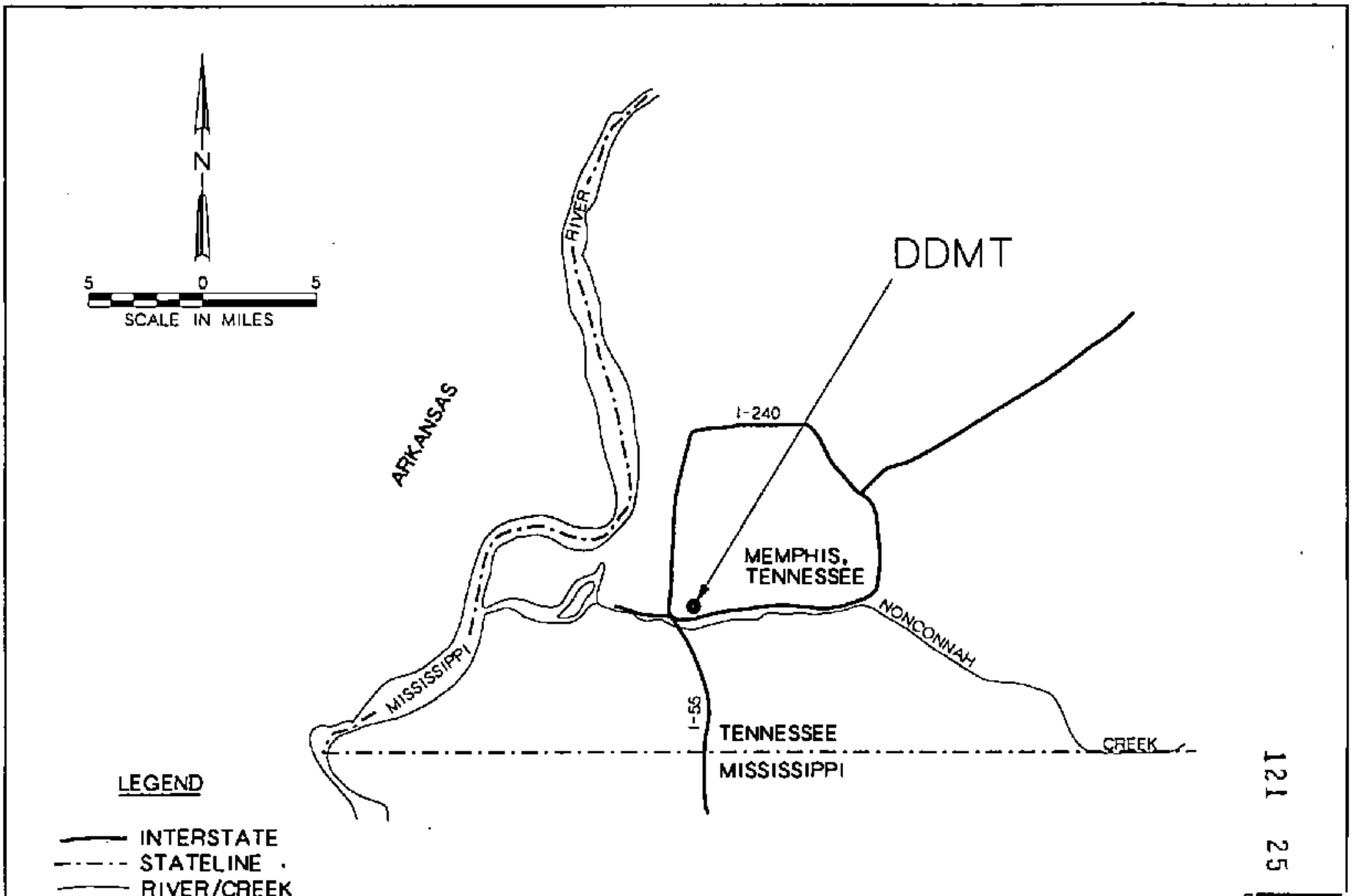
2.2 Facility and Operable Unit Descriptions

The DDMT facility has been geographically separated into four OUs. The boundaries and the designations for these OUs are presented in Figure 2-2. Each of the RI sites and screening sites falls within the boundary of a specific OU. Table 1-1 presents the OU associated with each site. The sites are presented as they relate to their status in the CERCLA process, as follows: RI site, screening site, ER site, *Chemical Warfare Management Plan* (CWMP), or NFA site.

A thorough description of the OUs is found in Section 2.3 of the *Generic RI/FS WP* (ref. 30). A brief description of each OU is presented below for the context of this SSFSP.

2.2.1 OU-1–Dunn Field

Dunn Field is the only known burial area on DDMT. Dunn Field is located north of the Main Installation and contains approximately 70 acres. Installation records indicate that various types and quantities of wastes were buried in Dunn Field. Each burial site selected for RI activities within Dunn Field is described in detail in the *OU-1 FSP* or the *CWMP*. The screening sites within the boundaries of OU-1 are described in this work plan. During previous investigations, a groundwater plume was identified that extends beyond the western boundary of OU-1. A proposed plan has been written that provides for a Groundwater Recovery and Discharge System to be designed and constructed as part of DDMT's progressive remediation efforts. There are a total of 39 identified sites within the boundary of OU-1, as follows: 6 are RI sites (addressed in the *OU-1 FSP*), 7 are screening sites (addressed by this document), 4 are CWMP sites, 17 are ER sites, 4 are NFA sites (addressed by the *NFA Report* [ref. 42]), and 1 is an FS site.



Source: Engineering-Science, 1993

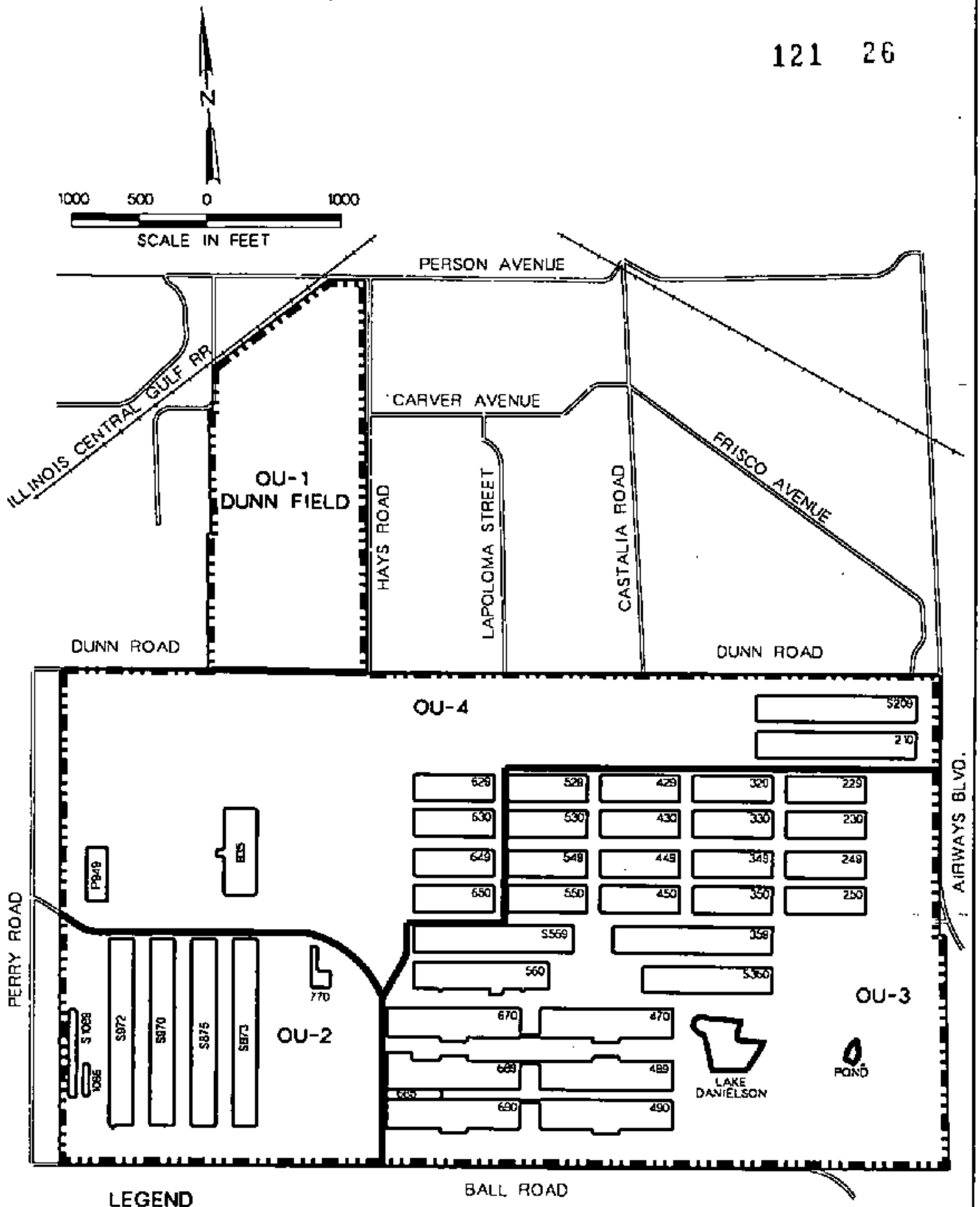
FIGURE 2-1
DDMT LOCATION IN MEMPHIS METROPOLITAN AREA
Defense Depot Memphis, Tennessee

CRMHILL

2-2

121 25

mss-0045.dgn 07-MAR-1995



Source: Engineering-Science, 1993

FIGURE 2-2
OPERABLE UNIT LOCATIONS
Defense Depot Memphis, Tennessee

mss-0045.dgn 07-MAR-1995

2.2.2 OU-2—Southwestern Quadrant of Main Installation

OU-2, geographically defined as the southwestern quadrant of DDMT, covers approximately 98 acres. OU-2 is further described as an area in which maintenance and repair activities have historically taken place. Additional significant activities that have occurred in OU-2 include hazardous materials recoupment, sandblasting, and painting. There are a total of 17 identified sites within the boundary of OU-2, as follows: 3 are RI sites (addressed in the *OU-2 FSP*), 6 are screening sites (addressed by this document), 3 are ER sites, 4 are NFA sites (addressed by the *NFA Report* [ref. 42]), and 1 is an FS site.

2.2.3 OU-3—Southeastern Watershed

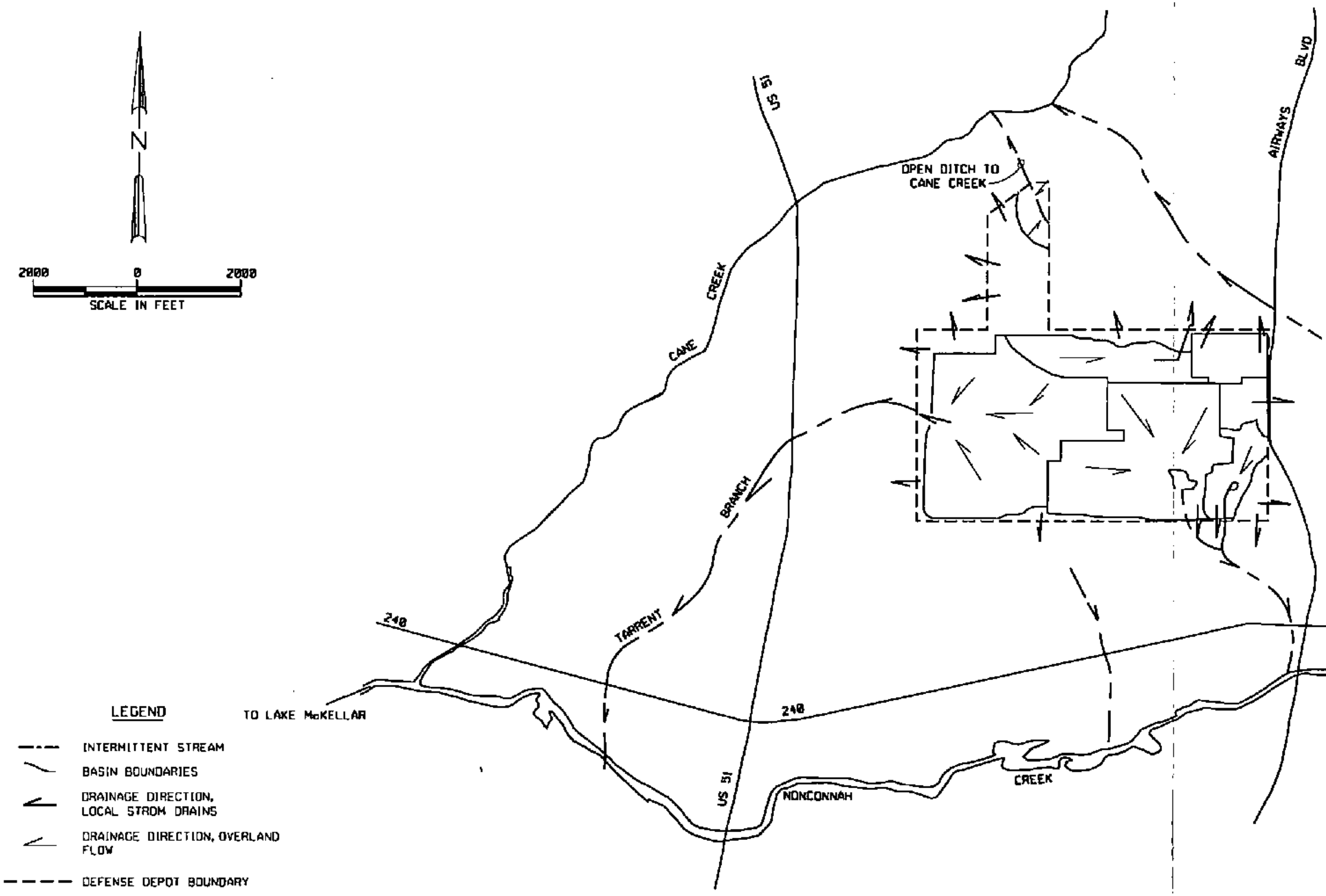
OU-3 is geographically defined as the southeastern portion of the Main Installation and covers approximately 292 acres. Significant sites within the boundaries of OU-3 include the Golf Course Pond (Site 25), Lake Danielson (Site 26), the former transformer storage area (Site 48), Pad 267 (Site 58), and Building T-273 (Former Pesticide Storage Area) (Site 59). There are a total of 22 identified sites within the boundary of OU-3, as follows: 3 are RI sites (addressed in the *OU-3 FSP*), 12 are screening sites (addressed by this document), 4 are NFA sites (addressed by the *NFA Report* [ref. 42]), and 3 are FS sites.

2.2.4 OU-4—North-Central Area

OU-4, geographically defined as the north-central portion of the Main Installation, covers approximately 168 acres. The most prominent feature of this OU is the former Hazardous Materials Storage Building (Building 629). The geographical area of OU-4 contains the former pentachlorophenol (PCP) dip vat area sites (near Building 737) and Building 629. Pesticides, polynuclear aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs) were detected during the RI Report (ref. 4) near Site 57. There are a total of 26 identified sites within the boundary of OU-4, as follows: 1 is an RI site (addressed in the *OU-4 FSP*), 20 are screening sites (addressed by this document), 4 are NFA sites (addressed by the *NFA Report* [ref. 42]), and 1 is an FS site.

2.3 Physiography

The surface drainage pathways for DDMT and their respective offsite receiving streams, as well as the current land use, are presented in Figure 2-3. Drawing 1 presents the investigation site locations at Dunn Field. Drawing 2 shows the investigation site locations for the Main Installation. All geological, climatological, physical, and surface drainage information for the DDMT Main Installation is discussed in detail in Section 2 of the *Generic RI/FS WP* (ref. 30).



SOURCE: MODIFIED FROM DDMT, 1982. DRAFT SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN.
MODIFIED FROM HARLAND, BARTHOLOMEW & ASSOCIATES, INC., 1988. MASTER PLAN REPORT, DDMT.
MODIFIED FROM DDMT, 1992. NPDES STORM DRAINAGE SAMPLING MAP, DRAWING NUMBER 45-90.

FIGURE 2-3
STUDY AREA SURFACE DRAINAGE

2.4 Hydrogeology

The facility is underlain by a layer of loess about 20 to 30 feet (ft) thick. Terrace deposits underlie the loess. The lower, saturated portion of the terrace deposits is referred to as the Fluvial Aquifer. Perched groundwater may also exist in the terrace deposits above small clay lenses at elevations above the Fluvial Aquifer. These perched water zones, where they occur, are temporal and are not considered part of the Fluvial Aquifer. The Fluvial Aquifer is not used as a drinking water source within the City of Memphis. The Memphis Sand Aquifer underlies the Fluvial Aquifer, and is the primary source of drinking water for the City of Memphis.

The Fluvial and Memphis Sand aquifers are separated by the Jackson Formation/Upper Claiborne Group, which generally consists of a low plasticity clay of variable thickness. The depth to the top of this unit ranges from about 70 ft below ground surface (bgs) to about 160 ft bgs. A depression in the top of the clay unit exists at the north-central portion of the Main Installation, at the southern end of Dunn Field (OU-1). The maximum thickness of this unit is estimated at 85 ft at stratigraphic test boring (STB)-6, while the minimum thickness (at STB-8) is 5 ft of sandy, silty clay and 9 ft of interbedded silty clay and fine-grained sand.

Figure 2-4 presents the November 1993 potentiometric surface map of the Fluvial Aquifer at DDMT. The map was compiled by contouring water levels recorded by Environmental Science & Engineering, Inc. (ESE), in November 1993 (ref. 38). The groundwater flow direction in the Fluvial Aquifer is toward the depression in the top of the clay unit. This portion of DDMT is a suspected area of hydraulic interconnection between the Fluvial Aquifer and the underlying Memphis Sand Aquifer. The extent of the suspected area of hydraulic interconnection is unknown. Depths to Fluvial Aquifer groundwater generally range from 60 ft to 140 ft in the depression on the north-central portion of the Main Installation. The groundwater in the Memphis Sand Aquifer flows westward toward the Allen Well Field.

2.5 Facility Use

The mission of DDMT is to warehouse and distribute an extensive inventory of supplies to the United States military and various government agencies. Because of this mission, DDMT stocks a wide inventory of commodities, ranging from clothing to petroleum products. Past practices at DDMT included disposal of some of these products when they became obsolete or unserviceable.

The Main Installation (OU-2, OU-3, and OU-4) is characterized by light industrial activities, primarily warehousing. The most prominent features are warehouses used for bulk storage. Most of the land area within the Main Installation has been graded, paved, and heavily built-up. The topography is primarily flat.

N

1000 500 0 1000

SCALE IN FEET

CANE CREEK ELEVATION 240 FT

CANE CREEK ELEVATION 230 FT

CANE CREEK ELEVATION 220 FT

NONCONNAH CREEK ELEVATION 210 FT

NONCONNAH CREEK ELEVATION 220 FT

NONCONNAH CREEK

CANE CREEK

PERSON AVE.

MANAGER RD.

DUNN ROAD

ELLISTON ROAD

MALLORY RD.

NORRIS ROAD

ALEX RD.

BALL ROAD

FRISCO AVE.

BOYLE AVE.

HEARST ST.

FERBER AVE.

FREMONT AVE.

HURLEY AVE.

ROSELLE ST.

DOMT BOUNDARY

ROSE HILL RD.

RAVEN AVE.

MERLIN AVE.

CANE AVE.

SPARKS CV.

EFFIE RD.

ELOISE RD.

DEMPSTER ST.

SILVER CV.

BOTTIE AVE.

GAUSCO AVE.

INORE AVE.

RALSTON AVE.

COMPTON AVE.

MW-1 229.04
MW-2 DRY
MW-3 233.39
MW-4 230.39
MW-5
MW-6 233.39
MW-7
MW-8
MW-9 232.05
MW-10 229.25
MW-11 229.25
MW-12
MW-13 230.97
MW-14 228.90
MW-15 230.03
MW-16 242.57
MW-17 DAMAGED
MW-18 174.98
MW-19 203.77
MW-20 200.60
MW-21 201.56
MW-22 201.66
MW-23 200.17
MW-24 191.11
MW-25 188.52
MW-25A
MW-26 204.02
MW-27 DRY
MW-28 235.05
MW-29 235.58
MW-30 231.40
MW-31 225.19
MW-32 229.71
MW-33 229.71
MW-34 192.19
MW-35 229.42
MW-36
MW-37 225.97
MW-38 194.45
SVE-12

240
230
220
210
200
190
180

LEGEND

- EXISTING MONITORING WELL LOCATIONS
- 210 EQUIPOTENTIAL CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION
- DDMT BOUNDARY CONTOUR INTERVAL = 10 FEET

NOTE:
ELEVATIONS ARE IN FEET ABOVE NATIONAL GEODETIC VERTICAL DATUM.

FIGURE 2-4
NOVEMBER 1993 POTENTIOMETRIC SURFACE MAP OF THE FLUVIAL AQUIFER

Dunn Field (OU-1) is characterized primarily by open areas where storage of materials or burial of wastes have historically occurred. The exception is the southeastern quadrant of Dunn Field, where storage of materials still occurs. The most significant materials stored on Dunn Field are bauxite and fluorspar. The topography of Dunn Field is primarily flat.

2.6 Screening Sites History

Site-specific histories are presented in Section 4 of this plan. The screening sites in this document have been identified by DDMT through the review of existing documents, interviews with facility personnel, and knowledge of the facility's operations. In addition, available historical data regarding site use, types, and quantities of materials stored, managed, and disposed are presented. Screening sites have not been fully investigated; therefore, a technically based screening process to evaluate each site is presented in this plan.

2.7 Existing Sampling Data

Data were collected at the facility during an RI Report (ref. 4) and other studies. These studies were conducted before the facility's listing as an NPL site. Where available, previous data are presented, including the reported data quality level and its significance to the site.

2.8 Overall Data Gaps

Using existing data, knowledge of site operations, and DDMT records, a review was conducted to evaluate where data was insufficient to achieve the objectives of the RI/FS process. The review process resulted in the identification of data gaps that need to be addressed during the RI/FS. Table 2-1 identifies data needs, existing data, and required data collection during the RI/FS on a facilitywide basis.

2.9 Screening Sites Data Gaps

The primary objective for conducting screening at a specific site is to evaluate the potential for a contaminant release. The data needed to achieve these objectives for the individual sites are presented in Section 4.

These data needs are addressed by the *Generic RI/FS WP* (ref. 30), this screening sites document, or the OU-specific FSPs.

Table 2-1
Overall Facility Data Gaps
Defense Depot Memphis, Tennessee

Data Need/Use	Existing Data	Future Data Collection
Groundwater Flow—Fluvial Aquifer	Dunn Field; Main Installation	Quarterly groundwater level measurements
Background water quality (metals)	Limited data for upgradient wells	Additional wells upgradient and offsite
Background soil chemistry	None available	Soil samples from offsite locations
Meet RCRA permit requirements for confirmatory sampling/RCRA Facility Investigation (RFI)	Available only for small number of sites	Sampling at sites
Evaluate offsite exposures for Baseline Risk Assessment (BRA)	Limited offsite data	Additional sampling offsite; records
Identify potential of releases from site as a result of past practices	Limited data from previous investigation	Screening sampling at sites. Collect media-specific samples to fulfill data need.

TAB

Section 3- Sampling Strategy for Screening Sites

3.0 Sampling Strategy for Screening Sites

3.1 Structure of Screening Sites Investigation

This section is intended to give a general description of the overall strategy for the investigation of each screening site. The approach presented is intended to support a decision to recommend one of the following options:

- Site upgrade (RI/FS activities)
- Site downgrade (support NFA)
- ER action for each screening site

The structure of the investigation was designed using the observational approach. This SSFSP is intended to implement RI/FS activities on a cost- and time-effective basis. Field screening procedures and statistical evaluations will be used to facilitate decision making, as defined by Figure 3-1.

3.1.1 Scope

The scope of the field investigation for the screening sites is limited to soil (surface and subsurface), surface water, and sediment sampling. The basic concept for field activities for screening sites is to gain data quickly and cost-effectively during field activities.

3.1.2 Approach

A phased approach is being used to implement the observational method to the screening sites investigation. The phases for the field activities include field screening (using Levels 1 and 2 data quality) and fixed-based laboratory (FBL) analyses (Levels 3 and 4 data). Forty-five sites at DDMT have been identified as needing screening and are included in this work plan. Each site is evaluated to identify the quantity and quality of data needed to achieve the objectives of the screening activities. The site-specific sampling activities are included in Section 4 of this report. The proposed decision logic diagram is presented in Figure 3-1. Comparison criteria including preliminary remediation goals (PRGs) and applicable or relevant and appropriate requirements (ARARs) used for data evaluation are presented in Section 3.3.

Parallel Activities
Conceptual Model Development, Exposure Assessment, Risk Based Criteria Development

Implement Screening Sites FSP (Meet Stage 1 DQOs)

Are Results Below Established Background? ①

Yes

No

Are Results Below Comparison Criteria? ②

Yes

No

Are results Above Removal Action Level? ③

No

Yes

Conduct Early Removal Evaluation

Early Removal Criteria Met

No

Yes

Implement Optional FSP Activities (Meet Stage 2 DQOs)

Conduct Statistical Based Evaluation for Site Comparison to PRGs and FRLs Consideration Given to Site Specific Exposure Assessment. ④

Are PRGs or FRLs Met Using Site Specific Exposure Assessment?

Yes

No

Early Removal Criteria Met

Yes

No

Scope of Screening Sites FSP Activities

No Further Action Recommended

Conduct RI/FS Activities

Early Removal w/confirmatory sampling

Stage 1 DQOs

- Collect samples from biased locations to determine if a release of contamination has occurred.
- Use Level 2 (Field & Lab) data to collect data quickly and economically.
- Use Level 3 FBL data to confirm results of Level 2 data.
- Collect TCL/TAL samples (20% of level 3, minimum 1 per site).
- Collect sufficient data to support early removal evaluation.

Stage 2 DQOs

- Collect samples per exposure pathway (site specific) to conduct a statistical based comparison to PRGs and FRLs. Random sampling will be conducted.
- Use Level 2 (Field & Lab) data to collect data quickly and economically.
- Use Level 3 FBL data to confirm results of Level 2 data.
- Characterize lateral/vertical extent of contamination.

Acronyms

DQOs - Data Quality Objectives
TSCL - Tennessee Soil Cleanup Levels
RHBC - Region III Health Based Criteria
GWPC - Groundwater Protection Criteria
FBL - Fixed Base Laboratory
FSP - Field Sampling Plan
FRL - Final Remediation Level
PRG - Preliminary Remediation Goal

① Background data set will be established using criteria identified in the Generic RI/FS Workplan.

② Comparison criteria are developed using TSCL, RHBC and GWPC, and other applicable regulatory criteria. These criteria are used as PRGs based on a conservative approach from the standpoint of risk (exposure and assessment criteria).

③ The removal action level will be established based on acute criteria of risks and economic factors.

④ FRLs are risk based target concentrations based on site specific conditions.

FIGURE 3-1
SCREENING SITES DECISION LOGIC DIAGRAM
Defense Depot Memphis, Tennessee

CH2MHILL

3.1.3 Field Screening

Field screening will be used to provide Level 2 analytical data that can be used to make timely decisions regarding the site investigations. The screening data will be coupled with Level 3 laboratory confirmational analysis (at a rate of 10 percent). The confirmational analyses will provide qualitative evaluation of the data and can be used to express the level of confidence with which one data set can be compared to another. The advantages of this type of assessment, as compared to using only Level 3, include quicker laboratory turnaround time for Level 2 results, the ability to change based on site conditions, timely contaminant delineation, and reduced costs. Section 3 of the *QAPP* (ref. 31) addresses quality assurance/quality control (QA/QC) of the sample activities and discusses data quality levels for each specific analytical constituent to be used for the screening activities.

3.1.4 Fixed-based Laboratory Procedures

Because of the wide variety of sites included for screening investigation, a complex array of analyses will be conducted for FBL analyses. On the basis of the known contaminants at each site, the existing data, and the level of uncertainty, each field sample collected will be screened for one or more target compounds using Level 2 protocol. Approximately, but no less than, 10 percent of the field samples will be sent to an offsite laboratory for confirmational analyses. Approximately, but no less than, 20 percent of the Level 3 data will be submitted for target compound list/target analyte list (TCL/TAL) analyses, and at a minimum, one sample from each site will be analyzed for the list TCL/TAL parameters. All Level 3 data will be retained by the laboratory in electronic format to produce Level 4 data package deliverables if requested. The list of analytical methods that will be used for analyses is presented in Section 4 of the *QAPP* (ref. 31). The selection of the confirmatory samples (Level 3), based on the results of Levels 1 and 2 data, will be made by the field team leader (FTL) according to the criteria defined in Sections 3.2 and 3.3 of this document.

3.1.5 Early Removal

Field data also can be used to support ER evaluations. That is, a site may be selected for ER evaluation and confirmational sampling rather than for RI. By conducting an ER on a site with limited contamination, a cost savings may be realized because of the reduced investigation costs associated with sites that undergo traditional RI/FS activities. The ER evaluation and ER action will be conducted as a parallel effort to the field screening and RI activities at the facility.

3.1.6 Primary and Optional Activities

Primary field activities include biased field sampling to evaluate the likelihood of a past release from the identified sites and to meet the data quality objectives (DQOs) (see Section 3.2). The analytical data in comparison to background data or PRGs will be used to evaluate the need for additional field sampling. Additional investigation may be

necessary when data are needed to conduct risk-based decisions to support the NFA alternative, or when contamination is present and the primary activities were insufficient to support the ER evaluation. By using the field analytical data, the FTL, in consultation with DDMT, can elect to implement optional activities to achieve the objectives of the screening activities and DQOs. By using the optional activities in this manner, work can be conducted during a single field event to prevent remobilization later.

3.2 Data Quality Objectives

DQOs are qualitative and quantitative statements that specify the quality of the data required to support the decision-making process during the sampling activities. DQOs are developed based on the intended final use of the data. Specific objectives of the screening sampling effort are divided into the following two parts: Stage 1 DQOs, to identify whether a release of contaminants has occurred, and Stage 2 DQOs, to assist in data collection to support the decision-making process. The general DQOs guiding the field investigation process are the following:

- Collect soil samples that are representative of actual site conditions.
- Provide reliable data results supported by QC measures implemented during sampling and analysis.
- Use Level 1 screening assays to aid in site sample location activities.
- Use Level 2 FBL analytical methods to expedite the decision-making process and to collect data quickly and economically. Use analytical techniques for Level 2 data that provide quality data for use in the risk assessment.
- Conduct sufficient Level 3 FBL analyses to support confirmation of Levels 1 and 2 data and to support risk-based decisions for the NFA alternative, where appropriate.
- Compare the levels of contamination at sites to applicable regulatory levels and calculated risk-based levels, so that the appropriate recommendations can be developed.
- Provide laboratory support to be able to produce Level 4 data package deliverables (in the future) to provide legally supportable documentation for decisions where needed.

As a result of a phased field investigation process, specific DQOs for each phase are necessary. These phase-specific DQOs are presented in Table 3-1.

Table 3-1 Specific DQOs for Screening Sites Defense Depot Memphis, Tennessee	
Stage 1 DQOs[a]	Stage 2 DQOs[b]
Conduct biased sampling at screening sites to evaluate the potential for a release from the site as a result of historical facility activities. Collect data to support the ER evaluation.	Collect samples for each exposure pathway to support statistical-based comparison to PRGs and to support the ER evaluation. Characterize lateral and vertical extent of contamination.
[a]Stage 1 DQOs are met using the primary sampling activities presented in Section 4 of this SSFSP. [b]Stage 2 DQOs are only applicable if a contaminant release has been identified during the primary field activities.	

3.3 Data Comparisons

Biased data will be collected during the screening sites field investigation. The biased data will be collected at locations where the highest probability of contamination exists. Once the screening sites field investigation is underway, data will be collected through the use of the Level 2 data quality, with a 7- to 10-day turnaround time. Four data comparisons will be conducted during the screening activities as part of the ongoing investigation. These data comparisons are as follows:

- Level 2 versus Level 3 data (23-day turnaround time) to assess the data usability. This comparison will be conducted after the Level 3 data have been analyzed by the laboratory and validated. The *QAPP* (ref. 31), Section 3.2.2.2, discusses the approach to assessing Level 2 data quality usability.

- Level 2 data will be compared to the background data for each biased sample location. Background data are discussed in Section 3.4 below. Level 3 data, once validated, will be used to support the data comparison.

- Level 2 data will be compared to the comparison criteria for each biased sample location. The comparison criteria are the screening PRGs and ARARs developed for the purpose of "screening" sites to evaluate whether a potential release has occurred that exceeds an acceptable risk. These data and their development are discussed in Section 3.5. Level 3 data, once completed, will be used to support the data comparison.

- Level 2 data will be compared to removal action levels (RALs) for each biased sample location. The RALs will be developed prior to the field investigation. Level 3 data, once completed, will be used to support the data comparison.

One data comparison will be conducted after the field investigation is complete. This data comparison will use a statistical approach to compare a site to PRGs and RALs. This approach is presented in Section 3.7.

3.4 Background Data

Background data for soil (surface and subsurface), groundwater, sediment, and surface water will be collected during the screening and RI field work activities. The approach to collecting these data is presented in Section 5.3.2 of the *Generic RI/FS WP* (ref. 30). The background data set will be used to establish individual background data numerical criteria for each constituent of concern and the method for establishing this background data numerical criteria. Individual parameters for each biased sampling location will be compared to the background data set to determine whether a contaminant release has occurred. If the data do not exceed the background data, the site will be recommended for NFA. The parameters that exceed background data will be considered for further investigation using the optional field activities (additional borings, wells, and ERs).

3.5 Preliminary Identification of Applicable, Relevant, and Appropriate Requirements and Preliminary Remediation Goals

3.5.1 Introduction

The purpose of this section is to summarize information used in the scoping phase of DDMT projects on issues relating to compliance with ARARs, including identification of PRGs. This information guides the development of appropriate sampling and analysis plans and ER actions, or facilitates the development of a range of appropriate remedial alternatives and can focus selection on the most effective remedy. Terms used in this section are defined in Table 3-2.

The procedures for the identification and evaluation of ARARs and PRGs are presented in several important sources, particularly the following:

- The NCP, specifically 55 FR 8741-8766 for a description of ARARs, and 8712-8715 for using ARARs as PRGs; also 53 FR 51394
- CERCLA Compliance Manuals (EPA 1988 and 1989)
- *Risk Assessment Guidance for Superfund: Volume I—Human Health Evaluation Manual. (Part B, Development of Risk-Based Preliminary Remediation Goals.)* EPA, 1991, (Risk Assessment Guidance for Superfund [RAGs] Part B)

Table 3-2
ARARs and PRGs Definitions
Defense Depot Memphis, Tennessee

Term	Definition
Applicable or Relevant and Appropriate Requirements (ARARs)	"Applicable" requirements are those clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal, state, or local law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site. "Relevant and appropriate" requirements are those clean-up standards which, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site, that their use is well-suited to the particular site. ARARs can be action-specific, location-specific, or chemical-specific.
Final Remediation Levels (FRLs)	Chemical-specific clean-up levels are documented in the Record of Decision (ROD). They may differ from preliminary remediation goals (PRGs) because of modifications resulting from consideration of various uncertainties, technical and exposure factors, as well as all nine selection-of-remedy criteria outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).
Preliminary Remediation Goals (PRGs)	Initial clean-up goals that (1) are protective of human health and the environment, and (2) comply with ARARs. They are developed early in the process based on readily available information and are modified to reflect results of the baseline risk assessment. They also are used during analysis of remedial alternatives in the remedial investigation/feasibility study (RI/FS).
Risk-based PRGs	Concentration levels set at scoping for individual chemicals that correspond to a specific cancer risk level of 10^{-6} or a Hazard Quotient/Hazard Index (HQ/HI) of 1. They are generally selected when ARARs are not available.
Screening Risk-based PRGs	Conservative risk-based estimates and guidance concentrations to be used for site and pathway screening. Lower values than typically estimated after a baseline risk assessment are presented—values correspond to an HQ/HI of 0.1.
Remedial Goal Options (RGOs)	Remedial goal options are typically developed during the baseline risk assessment to present risk managers with a range of possible target FRLs.
Removal Action Levels (RALs)	Concentrations that trigger consideration of removal actions based on the potential for acute or long-term chronic effects.

Three types of federal and state ARARs have been identified, as described below:

- **Chemical-specific**—Health or risk management-based numbers or methodologies that result in the establishment of numerical values for a given media that would meet the NCP "threshold criteria" of overall protection of human health and the environment and compliance with ARARs. The development and presentation of these "threshold criteria" are a major focus during this initial phase because of their role in the development of the specific sampling plans and their use in initial data interpretation.

- **Location-specific**—Restrictions placed on the concentrations of hazardous substances or the conduct of activities solely because they are in special locations (such as wetlands). Location-specific ARARs are not applicable for screening sites. PRGs are established conservatively using chemical-specific ARARs, or other guidance, to protect human health and the environment. Location-specific ARARs will be addressed in the OU-specific FSPs and the *Generic RI/FS WP* (ref. 30).

- **Action-specific**—Usually technology or activity-based requirements or limitations on actions taken with respect to hazardous waste. Action-specific ARARs are not applicable for screening sites. PRGs are established conservatively using chemical-specific ARARs, or other guidance, to protect human health and the environment. Action-specific ARARs will be addressed in the OU-specific FSPs and in Section 3.5 of the *Generic RI/FS WP* (ref. 30).

The detailed ARAR and PRG information provided in Section 3.5 of the *Generic RI/FS WP* (ref. 30) contains initial guidelines. The information does not establish that cleanup to meet these goals is warranted. As more information is obtained about all OUs and as remedial alternatives are considered, federal and state requirements will be narrowed to those that are potential ARARs for each alternative.

3.5.2 Chemical-specific Threshold Concentrations

Threshold criteria were developed for each media of potential concern, specifically groundwater, surface water, sediment, and soil. These include ARAR-based PRGs, guidance values that are "to be considered," and screening risk-based PRGs.

The screening PRGs that were developed represent a conservative approach to the interpretation of the site data. These data are intended for use in screening sites to evaluate whether "no further action" is required. At screening sites, a limited number of samples are being collected. As a result, a baseline risk assessment (BRA) may not be conducted because adequate data may not be available. Once a contaminant release has been identified, additional sampling will occur to support the BRA and risk-based decisions.

The screening PRGs were developed from information provided in RAGS Part B (1991) and guidance from EPA Region IV. Region III publishes screening PRGs, and the table is updated semiannually. Region III PRGs were used for guidance in developing the PRGs. However, the screening values for DDMT are more conservative than the Region III values. The following factors were considered and led to the development of these screening PRGs for DDMT:

- Presence of multiple contaminants
- Pathways not considered in the published values (soil-to-groundwater pathways)
- Potential ecological effects
- Appropriate land-use assumptions

Refer to Section 3.5 of the *Generic RI/FS WP* (ref. 30) for detailed development of PRGs and the numerical PRG criteria.

3.6 Risk-based PRG Calculations

The PRGs developed for use in DDMT work plans are designed to be protective of human health and the environment using conservative assumptions. In this way, they may be used for screening sites where a focused investigation is conducted to select locations that represent "worst-case conditions," and decision makers can be confident that chemicals reported below these concentrations would not result in unacceptable risks at the site after a BRA. For risk-based PRGs, the following general assumptions are used:

- Target Risk Level (TRL) of 10^{-6}; Target Hazard Index (THI) of 0.1
- Residential land-use assumptions
- Guidance values for potential ecological effects presented for surface water and sediments
- Estimate of potential effect for the soil-to-groundwater pathway
- Use of 10 percent of the PRG estimate as criteria for non-carcinogenic compounds, to address the potential presence of multiple chemicals.
- Inclusion of the dermal exposure pathway for surface soil contact in the PRG equation

The current land use is industrial, and many areas of the facility are located where worker exposures would be relatively infrequent. Risk estimates based on the TRL of 10^{-6} or THI of 0.1 would be protective if several chemicals were present below the specified concentrations. However, under conditions where 10 or more chemicals were reported, additional review would be required. Section 3.5 of the *Generic RI/FS WP* (ref. 30) presents detailed information regarding PRG development for each specific media. It also presents the numerical PRG tables.

3.7 Site Data Comparison

If a biased sample (assumed to represent potential contaminant location release) shows concentrations exceeding the conservative screening PRGs (but below the RAL), it is possible that the average concentration over the designated exposure area would not represent a potential for adverse effects. Statistical sampling may then be conducted to provide estimates of the average concentration for comparison with risk-based levels.

The exposure concentrations used in risk assessments reflect the arithmetic average of the concentration that would be contacted over the exposure period. Although this concentration may not reflect the maximum concentration that could be contacted at any one time, it is regarded as a reasonable estimate of the concentration likely to be contacted over time because assuming long-term contact with the maximum concentration is not reasonable. Providing that hot spots (areas of high concentration relative to other areas of the site, or elevated above a RAL) are not identified, risk estimates are based on the average concentration *(Risk Assessment Guidance for Superfund: Volume 1—Human Health Evaluation Manual [Part A], EPA, 1989)*. However, because of the uncertainty associated with any estimate of soil concentration, the 95 percent upper confidence limit (UCL95) on the arithmetic average is used for this estimate. The PRGs are based on the average exposure below the estimated concentration, and therefore, these would also be compared with a statistical estimate of the average.

This method is also documented in EPA guidance for statistical comparisons. For example, methods for testing whether soil chemical concentrations at a site are statistically below a cleanup standard or ARAR are presented in *Methods for Evaluating the Attainment of Cleanup Standards, Volume 1: Soils and Solid Media* (EPA, 1989) (EPA230/02-89-042). Several approaches are identified, including comparison of the estimate of the mean (UCL95) with the target concentrations.

TAB

Section 4 - Sampling Plan

4.0 Sampling Plan 121 45

Section 4 describes each site to be investigated during the screening sites field investigation effort. For each site, the following information is provided:

- Site description
- Site location and size
- Existing sampling data and potential contaminants of concern (PCOCs)
- Data gaps and site-specific DQOs
- Proposed sampling and analysis activities

Section 4 is organized by OUs. The following sections apply for each OU:

- Section 4.1—Screening sites located in OU-1
- Section 4.2—Screening sites located in OU-2
- Section 4.3—Screening sites located in OU-3
- Section 4.4—Screening sites located in OU-4

Levels 1, 2, and 3 analytical protocols are used for screening. Level 1 is used for gross field measurements. Levels 2 and 3 are proposed for quantifying concentrations of parameters of concern. Ten percent of Level 2 is targeted for Level 3 confirmational analysis to confirm Level 2 data usability. Sections 3.2 and 8.0 of the *QAPP* (ref. 31) describe the data quality levels and their usage.

Tables 4-1 and 4-2 present the proposed numbers of analyses by data quality levels for each site. The fold-out tables are placed at the end of Section 4.

4.1.1 Site 19—Former Tear Gas Canister Burn Site

DDMT records indicate that this site was used for the disposal of sanitary wastes, construction debris, smoke pots, and tear gas canisters. The EPA RFA (ref. 22) indicates that the tear gas canisters were placed directly on the ground and burned before burial. The information provided by DDMT indicates that Site 19 was used for this purpose from 1955 to 1960.

The site location is presented in the Dunn Field Investigation Site Location Map, Drawing 1. The site is located approximately 525 ft from the eastern boundary of Dunn Field, 825 ft from the northern boundary of Dunn Field, and approximately 100 ft east of the main lead railroad track. The boundary of the site was estimated using historical aerial photography and DDMT disposal maps. The aerial photography indicated ground disturbances indicative of a burial area. Historical disposal records indicate a maximum burial depth of 10 ft.

No sampling data have been collected specifically for this site. On the basis of the site description and the known potential for contamination at the facility, the PCOCs are semivolatile organic compounds (SVOCs), dioxins, metals, and tear gas or tear gas constituents (alkyl halides, chloroacetophenone, and bromide).

The following summary block identifies the major data gaps and DQOs for Site 19.

Site 19—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify whether release has occurred to surface soils.	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify whether release has occurred to subsurface soils.	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

A biased sampling approach was selected to assess whether contamination exists at the site. Two soil borings will be installed at the site to a depth of 20 ft. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. The location for the borings was selected based on locating the site using historical aerial photography in conjunction with DDMT disposal records. The borings extend 10 ft below the anticipated burial depth to possibly identify whether a release has occurred to subsurface soils beneath the burial.

Figure 4-1 presents the proposed sample locations. Eight samples (two borings, four samples per boring) will be collected and analyzed for SVOCs, dioxins, priority pollutant metals (PPMs), and bromide, using Levels 1 and 2 analytical methods.

One sample will be sent to an FBL for confirmational analysis (for TCL/TAL analyses). The TCL/TAL will be run on the sample with the highest relative amount of contamination (based on field screening results). Chloroacetophenone will be specifically requested on the SVOC analysis for Site 19.

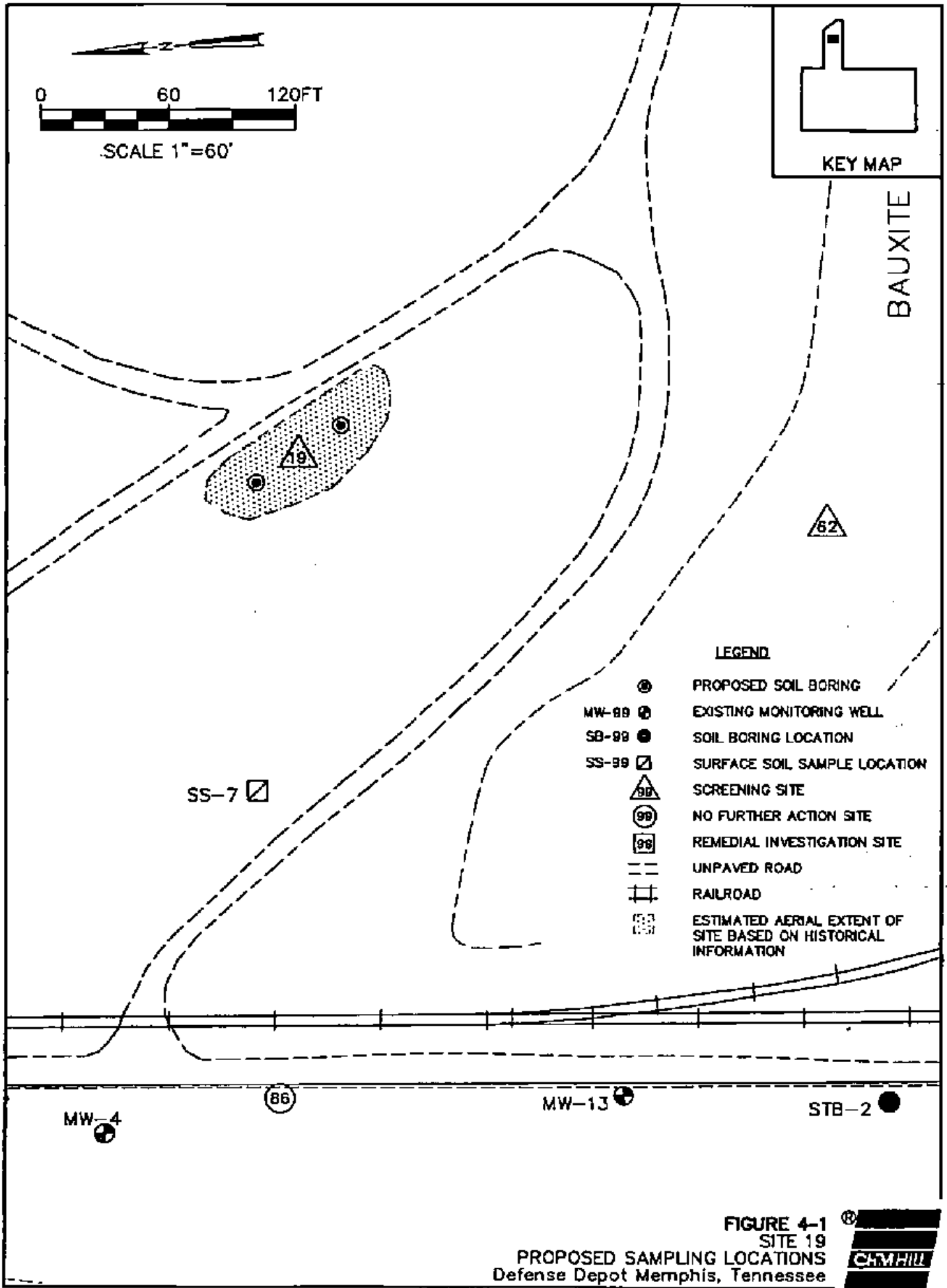


FIGURE 4-1
SITE 19
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0025.DWG 11-Oct-1995

4.1.2 Site 20—Probable Asphalt Burial Site

DDMT records identify Site 20 (Drawing 1) as an asphalt burial site. On the basis of facility disposal records, it is believed that burial did not exceed 10 ft. The deepest documented burial pit in Dunn Field is 8 ft for Site 12. The *Installation Assessment* (ref. 26) reported that both asphalt and roofing gravel were dumped in a surface fill at this location. Information obtained during personnel interviews indicates that the practice was discontinued before 1981, and the debris was removed.

The site location is presented in the Dunn Field Investigation Site Location Map, Figure 2-5. Two sites and their approximate boundaries were identified during the aerial photography review. The sites are approximately 570 ft from the eastern boundary and 360 ft from the northern boundary of Dunn Field. Historical records indicate a maximum burial depth of 10 ft.

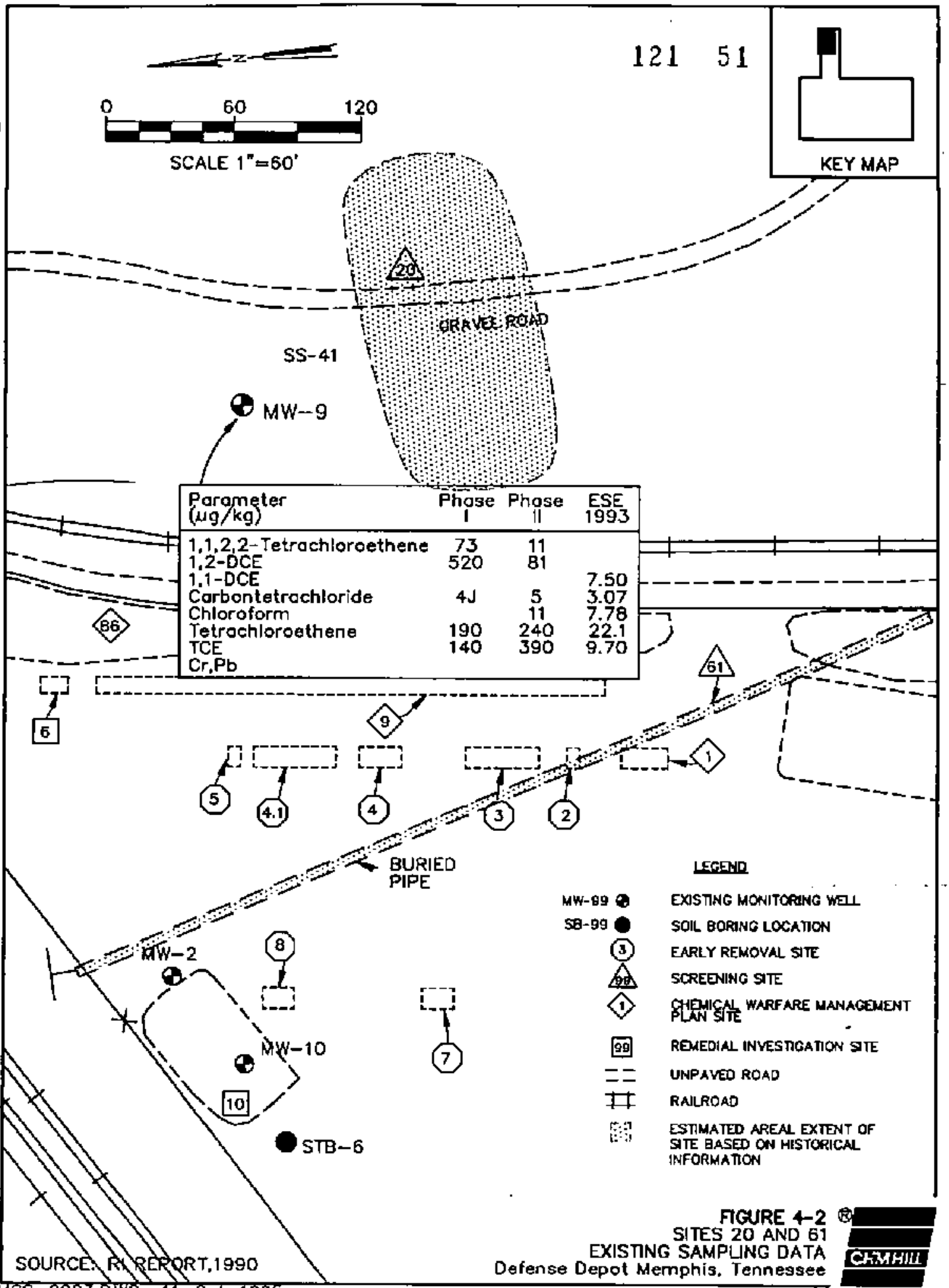
No soil samples associated with this site have been collected. Monitoring well (MW) 9 is within 100 ft of the location of Site 20. Volatile organic compounds (VOCs) and metals were detected in groundwater samples. Figure 4-2 and Table B-1 (in Appendix B) present the results of previous sampling. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are polynuclear aromatic hydrocarbons (PAHs). Also, because of the presence of VOCs and metals in an adjacent well, VOCs and metals (Ba, Cd, Cr, Ni, Pb, Hg, and Se) should be analyzed to possibly confirm the absence or presence of the source at Site 20.

The following summary block identifies the major data gaps and DQOs for Site 20.

Site 20—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify whether release has occurred to surface soils.	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify whether release has occurred to subsurface soils.	Use Level 2 data to expedite the field investigation and the decision process.
Source of VOCs and metals in MW-9 has not been identified.	Use Level 3 data to confirm the results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

A biased sampling approach was selected for this site to meet the DQOs described above. Three soil borings (to a depth of 20 ft) will be used (Figure 4-3) at biased locations to evaluate whether subsurface soil contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 10 ft, and 20 ft. The boring locations were selected based on historical aerial photography reviews and disposal maps provided by DDMT. The borings were extended to 10 ft below the anticipated burial depth to possibly identify whether a release has occurred to subsurface soils beneath the burial.

Nine samples (three borings, three samples per boring) will be collected and analyzed for VOCs, PAHs, and PPMs using Level 2 analytical methods. One sample will be sent to an FBL for confirmational analysis. The TCL/TAL will be run on the sample with the highest relative amount of contamination (based on field screening results).



SOURCE: RI REPORT,1990

FIGURE 4-2
SITES 20 AND 61
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

MSS-0023.DWG 11-Oct-1995

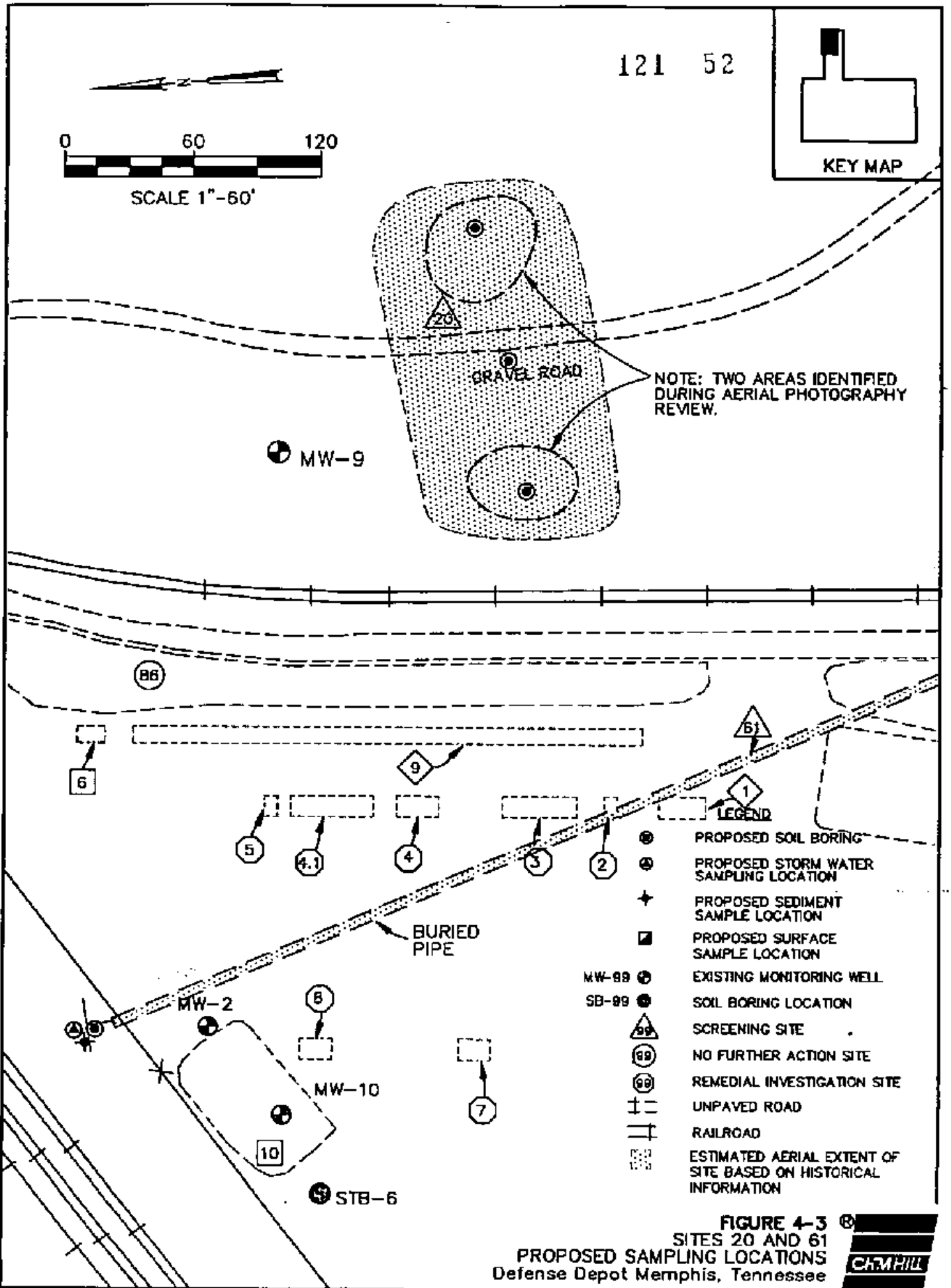


FIGURE 4-3
SITES 20 AND 61
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0033.DWG 11-Oct-1995

4.1.3 Site 21 – XXCC-3 Burial Site

Site 21, shown in Figure 4-4, is approximately 350 ft from the northern boundary at the eastern boundary fence (Drawing 1). The boundary of Site 21 was estimated using the *Installation Assessment* (ref. 26) conducted by the United States Environmental Hygiene Agency (USAEHA). This site has two separate trenches, each 260 ft by 25 ft. The depth of burial is not indicated; however, it is believed to be less than 10 ft deep because the deepest documented burial site is 8 ft for Site 12. XXCC-3 impregnite is believed to have been buried here.

The impregnite (XXCC-3) was produced by mixing CC-2 with zinc oxide (ZnO). CC-2 was a chemical produced by E. I. Dupont Nemours during the 1940s and 1950s. CC-2, (sym. dichlor-bis(2,4,6 trichlorphenyl)urea) a labile (unstable) organic compound, indicates the complexity with analytical measurement because of the compound's instability. The results of SVOC analysis are used to evaluate whether refractory organics are present that could have resulted from the breakdown of the structure of the urea. In particular, semivolatile chlorinated phenyl compounds and chlorinated aromatics probably would be present if the substance has undergone degradation.

No data are available for this site. Therefore, a biased sampling approach was selected to assess the presence of contamination. On the basis of the known potential for contamination at the facility, the PCOCs are SVOCs and zinc.

The following summary block identifies the major data gaps and DQOs for Site 21.

Site 21 – Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify whether release has occurred to subsurface soils.	Collect subsurface soil samples to evaluate the presence of a contaminant release. Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm the results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Four soil borings (to a depth of 20 ft) will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 10 ft, and 20 ft. The locations of the borings are shown in Figure 4-5 and were selected based on the location data obtained from USAEHA. The borings extend to 10 ft below the anticipated burial depth to possibly identify whether a release has occurred to subsurface soils beneath the burial.

Twelve samples (four borings, three samples each boring) will be collected and analyzed for SVOCs and zinc, using Level 2 analytical methods. One sample from two borings will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination.

121 55

PERSON AVENUE

0 60 120FT

SCALE 1"=60'

MW-28

Parameter
Pb,Ba,Cr,Cu,Ni,Zn

KEY MAP

21

21

CONCRETE LINED DRAINAGE CANAL

50

Parameter	(µg/kg)
4,4' DDE	160
4,4' DDT	170
Dieldrin	330
As,Pb,Ba,Cd,Cr,Cu,Ni,Zn	

50

SS-6

Parameter
Ba,Zn

SW-16

SW-1

Parameter	(µg/L)
Dieldrin	0.13
Ba,Cd,Cu,Zn	

85

60

MW-29

Parameter (µg/L)	Phase I	Phase II	ESE 1993
Chloroform		4.26	
1,1,1 TCA	ND	9	
1,1 DCA	ND	5	2.69
Tetrachloroethene	ND	67	43.1
TCE	ND	24	14.9
1,1 DCE			32.1
Chrysene			1.68
As,Pb,Ba,Cd,Cr,Cu,Ni,Zn			

MW-8

Parameter (µg/L)	Phase I	Phase II	ESE 1993
1,1,1 TCA	5	5	1.96
1,1 DCA	3J	4J	1.83
1,1 DCE	68	68	34.4
Tetrachloroethene	58	54	35.2
TCE	21	21	15.3
Pb,Sb,Ba,Cr,Cu,Ni,Zn			

LEGEND

- MW-99 EXISTING MONITORING WELL
- SS-99 SURFACE SOIL SAMPLE LOCATION
- SW-1 SURFACE WATER SAMPLE LOCATION
- 99 SCREENING SITE
- 85 EARLY REMOVAL SITE
- RAILROAD
- ESTIMATED AREAL EXTENT OF SITE BASED ON HISTORICAL INFORMATION

SOURCE: RI REPORT, 1990

FIGURE 4-4
SITES 21 AND 50
EXISTING SAMPLING DATA

CH2MHILL

121 50

MW-28

KEY MAP

0 60 120FT

SCALE 1"=60'

PERSON AVENUE

21

21

50

CONCRETE LINED DRAINAGE CANAL

CONCRETE CHANEL SEAM

50

CONCRETE CHANEL SEAM

SS-6

SW-16

SW-1

85

MW-29

60

MW-8

LEGEND

- PROPOSED STORM WATER SAMPLE LOCATION
- PROPOSED SOIL BORING
- PROPOSED SEDIMENT SAMPLE
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- MW-99 EXISTING MONITORING WELL
- SW-99 SURFACE WATER SAMPLE LOCATION
- SS-99 SURFACE SOIL SAMPLE LOCATION
- 99 SCREENING SITE
- 99 EARLY REMOVAL SITE
- RAILROAD
- ESTIMATED AERIAL EXTENT OF SITE BASED ON HISTORICAL INFORMATION

FIGURE 4-5
SITES 21 AND 50
PROPOSED SAMPLING LOCATION

CH2MHILL

4.1.4 Site 50—Drainage Canal

This site is a concrete-lined drainage channel that carries storm water runoff from the eastern part of Dunn Field and from the adjoining property on the east to the storm water discharge point at the northern boundary of Dunn Field. The storm water flows through an unnamed tributary to Cane Creek, then to Nonconnah Creek, a tributary of the Mississippi River. The channel is primarily located in the rolling grassy area of Dunn Field. The ditch collects storm water runoff from Sites 19, 20, 21, 60, 62, and 85. Pesticides and other constituents from these sites may have been transmitted to receiving waters through Site 50.

The site location is presented in the Dunn Field Investigation Site Location Map, Drawing 1. Site 50 is approximately 1,000 ft long (about 3 ft wide) and is located in the northeastern corner of Dunn Field. The concrete channel was constructed in the 1940s and has been used since its construction for storm water runoff. Site 50 is illustrated in Figure 4-4.

As part of the *RI Report* (ref. 4) during 1990, surface water (SW) samples SW-1 and SW-16 were collected from the channel (during storm water runoff) and chemically analyzed. The site location and existing data are shown in Figure 4-4. The analytical results are presented in Table B-2. The data indicate that metals and dieldrin were detected in the runoff. On the basis of the information provided for Site 50, the previous analytical results, and the known potential for contamination at the facility, the PCOCs for storm water runoff are PPMs and pesticides. Additional parameters of concern for soils (to confirm or deny historical release pathways) include VOCs, SVOCs, and dioxins.

The following summary block identifies the major data gaps and DQOs for Site 50.

Site 50—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify whether release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify whether release has occurred to subsurface soils.	Collect samples for TCL/TAL analyses because of the risks associated with the storm water exposure pathway.
Confirmation of previous storm water sampling results.	Collect one storm water sample during a rainfall event to confirm previous results.

Three soil borings will be installed to a depth of 10 ft in biased locations to evaluate whether contamination is present in the surface and subsurface soils adjacent to and under the drainageway. Samples will be collected near seams in the concrete drainage ditch (two) and from the drainage ditch outfall at depths of zero to 12 inches, 5 ft, and 10 ft, as shown in Figure 4-5. The sample locations were selected based on the physical characteristics of the drainageway. The samples collected at the inlet and outlets will be used to investigate the contaminants entering and exiting the drainageway. The final boring will be used to assess the presence of contamination entering the drainageway from the second inlet structure, which is shown in Figure 4-5. The borings extend to 10 ft below ground surface (bgs) to possibly identify whether a release has occurred to the underlying subsurface soils.

Nine samples (three borings, three samples per boring) will be collected and analyzed for VOCs, SVOCs, PPMs, dioxins, and pesticides in the FBL. On the basis of field screening results, a TCL/TAL will be run on two samples with the highest relative amount of contamination. After a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, one storm water sample and one sediment sample will be collected at the outfall of the drainage channel on the northern end of Dunn Field within 48 hours of the rainfall. These samples will be analyzed for VOCs, SVOCs, dioxins, pesticides, and PPMs.

4.1.5 Site 61—Buried Drain Pipe

DDMT's facility maps indicate that this pipe is a storm sewer drainage pipe approximately 428 ft long and 24 inches in diameter. According to maps provided by DDMT, the inlet is just east of the railroad tracks in the northern half of Dunn Field, and the storm sewer pipe runs in a northwesterly direction offsite, as shown in Drawing 1. Aerial photography indicates the general location of the drain. The drain was installed in the mid-1950s and has been used since that time for storm water conveyance.

No sampling data exist for Site 61. Therefore, a biased sampling approach was selected to assess the presence of contamination. Storm water runoff occurs from areas of Dunn Field that include a variety of burial sites. Additionally, groundwater contamination of metals and VOCs is present in the northwestern corner of Dunn Field. On the basis of the potential contribution from a wide variety of sites and the surface water exposure pathway, the PCOCs' list for Site 61 is not limited to a specific analytical list. All samples should be analyzed for VOCs, SVOCs, PPMs, pesticides, dioxins, and thiodyglycol (a breakdown product of mustard gas) to support decisions regarding this site as a potential source of contamination.

The following summary block identifies the major data gaps and DQOs for Site 61.

Site 61—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify whether release has occurred to surface soils. No data to identify whether release has occurred to subsurface soils. No data to indicate whether current surface water is contaminated.	Collect storm water and surface and subsurface soil samples to evaluate the presence of a contaminant release.

One soil boring will be installed near the outfall of the pipe, and samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Figure 4-3 presents the proposed sample location. This sample location was selected because it should detect contaminants that may be migrating from Dunn Field. The boring extends below the drainage pipe to possibly identify whether a release has occurred to the underlying subsurface soils.

Four soil samples (one boring, four sampling depths) will be collected and analyzed for VOCs, SVOCs, PPMs, pesticides, dioxins, and thiodyglycol (using Level 3 analytical methods). Also, after a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, one storm water sample and one sediment sample will be collected at the outfall of the drainage channel on the northern end of Dunn Field within 48 hours after the rainfall. These samples will be analyzed for VOCs, SVOCs, PPMs, pesticides, dioxins, and thiodyglycol (Level 3 analytical methods).

4.1.6 Site 64—Bauxite Storage, Southwestern Quadrant of Dunn Field

Site 64 is a historic bauxite area stockpiled above ground in the southwestern quadrant of Dunn Field. Other investigation sites (burial) have been identified that coincide with this area. These sites will be discussed individually in this or other documents. The storage area previously contained only bauxite, a nonhazardous commodity. Bauxite is a naturally occurring mixture of hydrous aluminum oxides (diaspora, gibbsite, and boehmite), usually containing iron. The chief deposits of bauxite in the U.S. occur in Arkansas, Georgia, and Alabama. The primary use of bauxite is aluminum ore production. The bauxite was stored in the southwestern corner of Dunn Field from June 14, 1950, to 1972, when the bauxite was moved offsite.

Site 64 (Figure 4-6) covers approximately 7 acres. The site location is presented in the Dunn Field Investigation Site Location Map, Drawing 1. The boundary of the site was estimated using historical aerial photography and DDMT's disposal records.

The DDMT wells were sampled during the ESE, Inc., groundwater monitoring effort conducted in 1993, and analyzed for aluminum. Results of these tests indicate aluminum in the groundwater at the facility (up to 78.8 milligrams per liter [mg/L]). Total metals were analyzed during this event. No data are available to identify whether aluminum is in the particulate or soluble form in the groundwater samples. Surface soil samples in this quadrant of Dunn Field detected metals, PAHs, and dieldrin. Dieldrin was used as a pesticide at DDMT. All grassed areas, as well as the extent of the pesticide contamination, will be addressed during the Site 73 study.

Site 73 is an FS site defined as all grassed areas; therefore, it overlaps Site 64 (and others). Pesticides have been detected facilitywide as a result of historical application. Sufficient data exist to document the character of pesticides present at the facility. Therefore, pesticide contamination facilitywide in surface soils is being addressed in the Site 73 evaluation.

On the basis of the existing data and the known potential for contamination from the bauxite site, the PCOCs are PAHs and metals.

The following summary block identifies the major data gaps and DQOs for Site 64.

Site 64–Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify whether Site 64 has been a source of contamination to surface water and sediment. No data to indicate whether a release has occurred to surface water and sediment.	Collect surface water and sediment samples to evaluate the presence of a contaminant release. Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm Level 2 data.

Two sediment and surface water sample pairs will be collected to evaluate the presence of contaminants that may be migrating from the site (same location–two storm water events). Samples will be collected at the surface water runoff locations at the facility boundary. The samples will be analyzed for PPMs, aluminum, and PAHs.

The surface water and sediment samples will be collected in accordance with Section 5.3 of the *QAPP* (ref. 31).

121 62

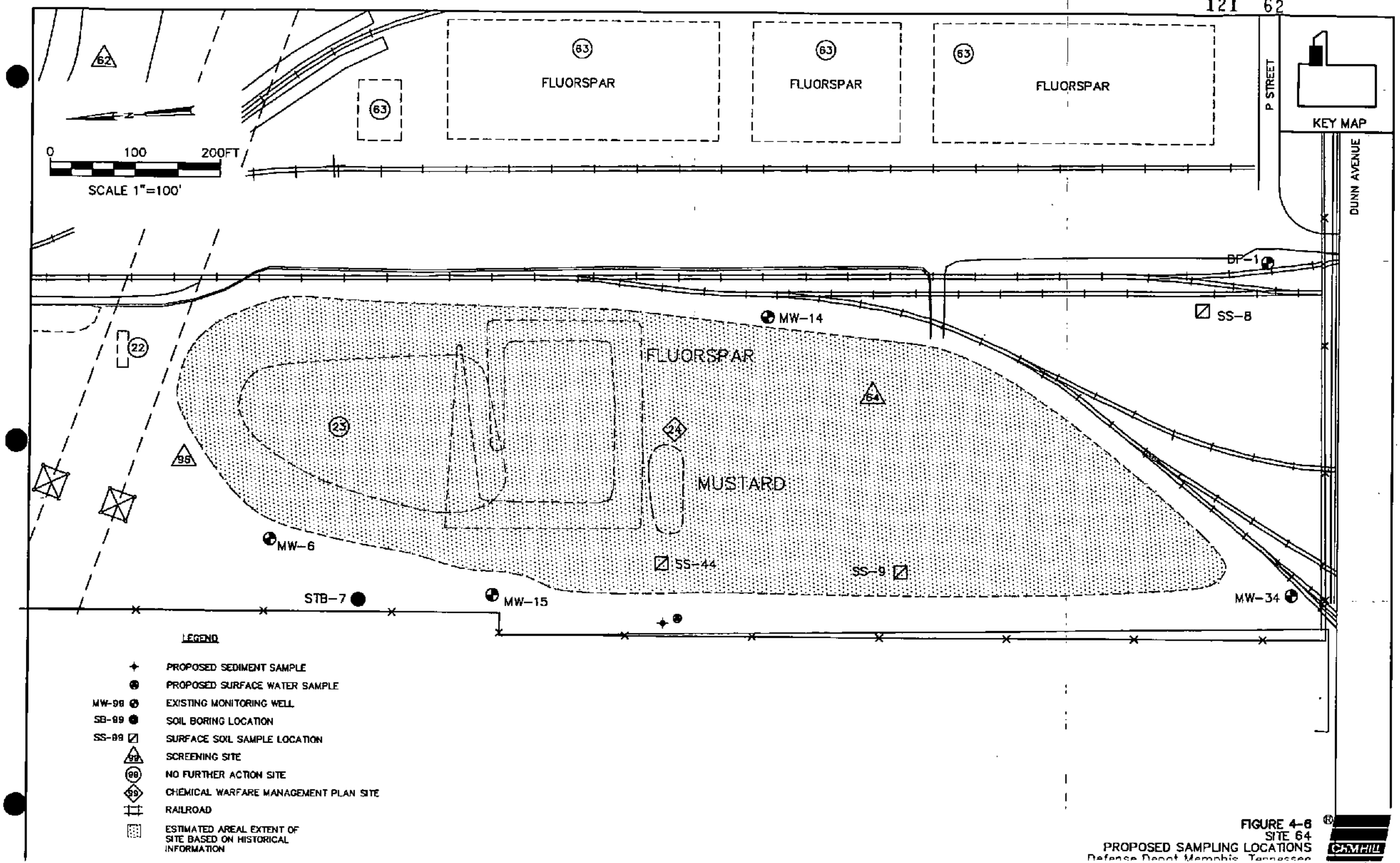


FIGURE 4-6
SITE 64
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.2 OU-2 Screening Sites

4.2.1 Site 31—Former Spray Paint Booth

Site 31 is the former location of a drive-through, water cascade spray paint booth and drying oven, which was used to conduct major stock primer and enamel spray painting operations. The water cascade booth in Building 1087 was replaced in late 1985 with a dry filter spray paint booth located in Building 1086 (ref. 8).

The site is located on the Main Installation in the southwestern quadrant, along the back wall of Building 1087 (Drawing 2). Site 31 was estimated to be used from the 1950s through 1985.

During the *RI Report* (ref. 4), surface soil sample SS-18 was collected near this site. As shown in Table B-4, this sample detected pesticides, VOCs, PAHs, and metals. Additionally, MW-22 is located approximately 100 ft southwest of Site 31. Contaminants detected in groundwater from this well during the *RI Report* (ref. 4) include tetrachloroethene, N-nitrosodiphenylamine, and metals (also see Table B-5). Also, other surface soil samples were collected in the vicinity of Site 31. These samples contained PAHs, pesticides, polychlorinated biphenyls (PCBs), and metals (Figure 4-7). On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are PAHs, PCBs, VOCs, and metals.

The following summary block identifies the major data gaps and DQOs for Site 31.

Site 31—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to subsurface soils	Collect surface and subsurface soil samples to evaluate the presence and extent of contamination.
Delineate extent of surface soil contamination	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

A biased sampling approach was selected for this site. Therefore, two soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, 20 ft, and 40 ft. Four surface soil samples will be collected to possibly delineate the surface soil contamination, as shown in Figure 4-8. The sample locations were selected based on the previous sampling results, which identified contamination at the site. The 40-foot depth was selected because contaminants, which may be a result of operations at the site, were detected in MW-22.

Fourteen samples (two borings, five samples each, and four surface soil samples) will be collected and analyzed for VOCs, PCBs, PAHs, and metals using Level 2 analytical methods. One sample from each boring (two samples) will sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL analysis will be conducted on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining confirmational sample.

0 60 120FT

SCALE 1"=60'

Parameter	(µg/kg)
Toluene	4J
Total PAHs	27670
4,4'-DDD	250
4,4'-DDE	1300
4,4'-DDT	7400
Total PCBs	10.0
Ba,Cd,Cr,Ni,Pb,Hg, Sb,Cu	

Parameter	(µg/kg)
Total PAHs	4770
4,4'-DDE	400
4,4'-DDT	1100
Ba,Cd,Cr,As,Pb,Se, Sb,Cu,Ni,Zn	

Parameter	(µg/kg)
Toluene	6
Total PAHs	18920
4,4'-DDE	180
4,4'-DDT	660
Dieldrin	220
Ba,Cd,Cr,Ni,Pb,Hg,	

Parameter	(µg/L)
Toluene	5J
Total PAHs	840
4,4'-DDD	45
4,4'-DDE	110
4,4'-DDT	450
Total PCBs	595
Ba,Cd,Cr,Ni,As,Pb,	

Parameter (µg/L)	Phase I	Phase II	ESE 1993
Tetrachloroethene	5	11	
TCE			1.29
N-Nitrosodiphenylamine	3		
As,Pb,Hg,Cd,Cr,Ni			

Parameter	(µg/kg)
Total PAHs	910
4,4'-DDD	13
4,4'-DDE	27
4,4'-DDT	110
Cr,Ni,Pb,Ba,Cu,Zn	

Parameter	(µg/kg)
Total PAHs	8040
4,4'-DDD	52
4,4'-DDE	97
4,4'-DDT	260
Total PCBs	690
Ba,Cr,Ni,Pb,Cd,Cu, Zn	

Parameter	(µg/kg)
Toluene	2J
Total PAHs	2050
4,4'-DDE	33
4,4'-DDT	90
Cr,Ni,Pb,Ba,Cu,Zn	

Parameter (µg/L)	Phase I	Phase II	ESE 1993
Tetrachloroethene	39	5	49.3
TCE			4.42
N-Nitrosodiphenylamine	3		
As,Pb,Cr,Ni			

No Compounds Detected

KEY MAP

LEGEND

- MW-99 EXISTING MONITORING WELL
- SB-99 SOIL BORING LOCATION
- SS-99 SURFACE SOIL SAMPLE LOCATION
- SCREENING SITE
- NO FURTHER ACTION SITE
- EARLY REMOVAL SITE
- SITE AREA

SOURCE: RI REPORT, 1990

FIGURE 4-7
SITES 31 AND 33
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

0 60 120FT

SCALE 1"=60'

KEY MAP

1084 1086 1087 1088 1089 1090 1091

87 88 29 30 31 32 33 89

SS-15 SS-16 SS-17 SS-19 SS-45 SS-46

CONC. CONC. CONC.

RAMP RAMP

MW-21 MW-22 STB-5

295 305 310 300

PERIMETER FENCE

LEGEND

- PROPOSED SOIL BORING
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- MW-99 EXISTING MONITORING WELL
- SB-99 SOIL BORING LOCATION
- SS-99 SURFACE SOIL SAMPLE LOCATION
- 88 SCREENING SITE
- 98 NO FURTHER ACTION SITE
- 98 EARLY REMOVAL SITE
- RAILROAD
- SITE AREA

FIGURE 4-8
SITES 31 AND 33
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2M HILL

4.2.2 Site 33—Sandblasting Waste Drum Storage Area

Site 33 consists of an open-sided, metal roof shed with a gravel floor. Historically, 55-gallon drums containing spent sandblasting material have been stored at this site. As of 1990, the existing drums at this site were in good condition, and there was no evidence of any container failures.

Site 33 is in the southwestern corner of the Main Installation, adjacent to Building 1088. The site is located approximately 150 ft from the western boundary of the installation and approximately 360 ft from the southern boundary of the installation (Drawing 2).

O. H. Materials (OHM) obtained one sample from sandblasting material located at the sandblasting area in 1985 and conducted a toxic metals analysis. No contamination above detectable limits was found. During the *RI Report* (ref. 4), a surface soil sample (SS-15) was taken adjacent to the site; this sample indicated the presence of toluene, PAHs, pesticides, PCBs, and metals. A monitoring well (MW-22) located 90 ft south of the site was sampled during Phase I and Phase II. This well indicated the presence of tetrachloroethene and metals. Figure 4-7 and Tables B-4 and B-5 present the results of previous sampling. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, PAHs, PCBs, and metals.

The following summary block identifies the major data gaps and DQOs for Site 33.

Site 33—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to subsurface soils	Collect surface and subsurface soil samples to evaluate the presence of and possibly delineate extent of contamination.
Delineate extent of surface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, 20 ft, and 40 ft. Three surface soil samples also will be collected to assist in delineating the surface soil contamination. Figure 4-8 presents the biased proposed sample locations. The sample locations were selected based on previous sampling results that identified contamination. The 40-foot depth was selected because contaminants, which may be a result of operations conducted at this site, were detected in MW-22.

Eighteen samples (three borings, five samples each, and three surface soil samples) will be collected and field screened for VOCs, PCBs, and metals using Level 2 analytical methods. One sample from a boring and one surface soil sample (two samples) will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be conducted on the two samples with the highest relative amount of contamination.

Three additional surface soil samples will be placed along the fence adjacent to Site 33 from zero to 12 inches bgs. These samples will be collected to evaluate the possibility of airborne transport of contaminants. The three samples will be analyzed for VOCs, PCBs, and metals using Level 2 data quality protocols.

4.2.3 Site 82—Flammables (Buildings 783 and 793)

Buildings 783 and 793 (igloos) were previously designated for the storage of flammable items and ordnance material and are the location of the former DDMT recoupment facility. The interior floor of Building 783 is constructed of concrete and slopes to the north and south walls. Along these walls are drains that lead to the exterior of the building (on the eastern side). Also, Building 793 (approximately 400 ft south of Building 783) is an igloo used for the same purpose.

The site is situated at the southwestern intersection of K Street and 9th Street, as shown in Drawing 2.

No sampling data exist specifically for this site. Therefore, a biased sampling approach was selected to assess the presence of contamination. Because a wide range of materials was managed at the site, there is a significant potential for contamination, although the PCOCs are unknown. Flammables, explosives, and dioxin-laden soils were known to have been stored in the igloos, according to facility records. Samples will be analyzed for VOCs, SVOCs, pesticides, PPMs, and dioxins.

The following summary block identifies the major data gaps and DQOs for Site 82.

Site 82—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings at biased locations will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Two additional surface soil samples will also be collected at biased locations (storm water pathways) to assess the presence of surface soil contamination, as shown in Figure 4-9. The sample locations were selected because the stored chemicals were stored, loaded, and unloaded in the area. A drain is located on either side of the building where the soil borings are located. A boring depth of 20 ft was selected because shallow soil contamination is the probable condition due to possible surface spills during loading and unloading.

Ten samples (two borings, four samples per boring, and two surface soil samples) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical

methods. These samples also will be analyzed for dioxins using Level 3 data quality. One sample from a boring and a surface sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be conducted on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining sample. Also, Building 793 (identical to 783 and approximately 300 ft to the south) will be investigated using the identified methods for Building 783.

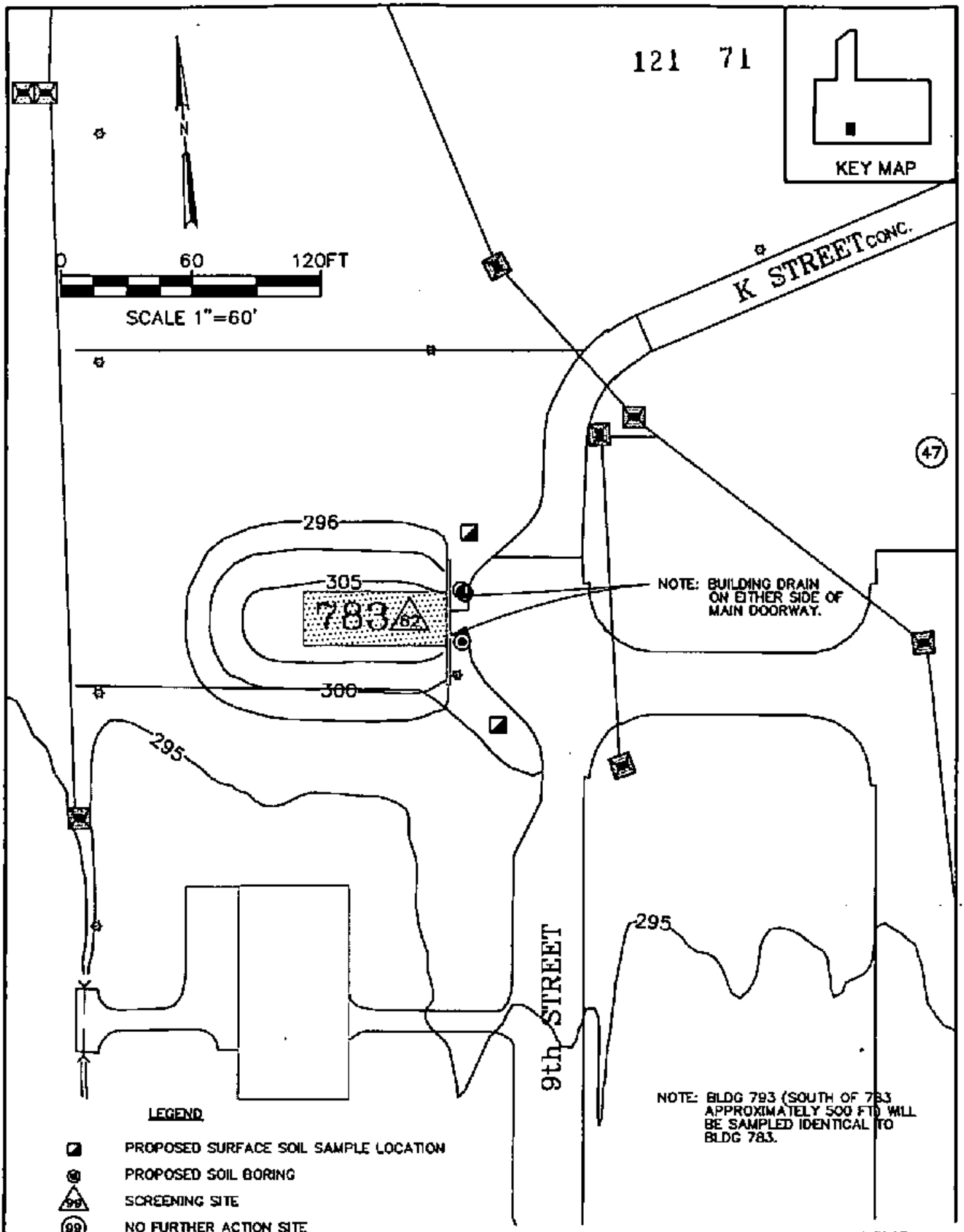


FIGURE 4-9
SITE 82
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0007.DWG 11-Oct-1995

4.2.4 Site 84—Building 972

Building 972 was a storage area for flammables, solvents, waste oil, and other raw materials. Site 84 is situated in the southwestern portion of the Main Installation, as presented in Drawing 2. Building 972 is located between 25th and 21st Streets.

No samples associated with this site have been collected. On the basis of past activities conducted at this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and metals.

The following summary block identifies the major data gaps and DQOs for Site 84.

Site 84—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

A biased sampling approach was selected for this site. Four soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Six surface soil samples (Figure 4-10) also will be collected to assist in delineating the surface soil contamination. The biased sample locations were selected at probable pad runoff locations and near storm water inlets because surface water flow may transport contaminants and cause them to accumulate in areas where surface water may pond. A boring depth of 20 ft was selected because shallow soil contamination is the probable condition due to possible surface spills during loading and unloading of liquids.

Twenty-two samples will be collected and analyzed for SVOCs, VOCs, pesticides, and metals using Level 2 analytical methods. One sample from a boring and two surface soil samples will be sent to an FBL for confirmational analysis (three samples). On the basis of field screening results, a TCL/TAL will be conducted on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining two confirmational samples.

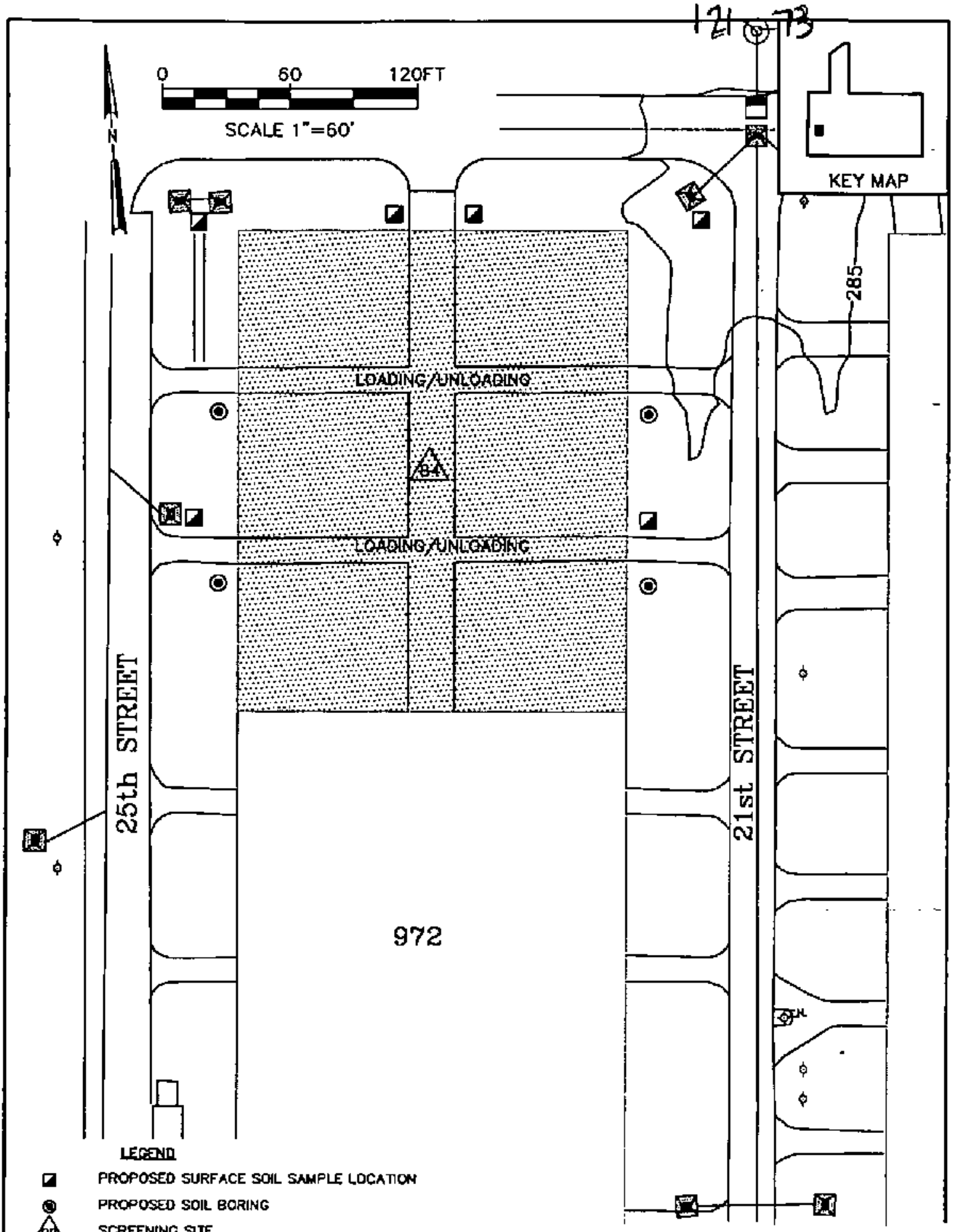


FIGURE 4-10
SITE 84
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0005.DWG 11-Oct-1995

4.2.5 Site 89—Building 1089

Site 89 is located on the western boundary of OU-2. The site includes Building 1089 and the immediate surrounding area. The location of Site 89 in OU-2 is shown in Drawing 2; a detailed map of the site is provided in Figure 4-11. Past uses of Building 1089 included storage of various acids. Spills have reportedly occurred at this site; however, specific spill information (such as location, date, and amount spilled) has not been identified to date (ref. 4). In addition to acid storage, the *Installation Assessment* (ref. 26) indicated that sandblasting operations had been performed in the northern portion of this building.

Previous investigations did not characterize potential soil contamination at this site. However, analysis of surface soils at SS-45 (Appendix B, Table B-4) as part of the Site 32 investigation did show elevated concentrations of metals just south of Building 1089. The soil sample locations are shown in Figure 4-11.

To investigate groundwater contamination, MW-21 was installed in the Fluvial Aquifer immediately west of the building during the 1990 RI activities (ref. 4). Analyses of groundwater samples from MW-21 indicate the presence of VOCs and metals (Table B-5). At the time MW-21 was installed, it was thought to be downgradient of the site (ref. 4). However, current data and the November 1993 potentiometric surface map indicate that MW-21 is upgradient of Building 1089 (Figure 2-4). However, the locations of releases at Site 89 are unknown, so the contaminants found in MW-21 may have resulted from releases from the site. Another possibility is that offsite contamination is entering the DDMT facility and being detected in MW-21.

Acid spills at the site may have leached metals in the subsurface, so metals are a concern. Sandblasting operations could also release metals from equipment being cleaned. VOCs would not typically be included, but results from MW-21 indicated tetrachloroethene above maximum contaminant levels (MCLs), and the source is unknown. Therefore, VOCs should be investigated at the site.

From what is known about the history of the site and from the results of surface soil samples at SS-45, the PCOCs are believed to be metals and VOCs. Soil pH also will be investigated to assess whether conditions that could lead to leaching of metals are still present.

The following summary block identifies the major data gaps and DQOs for Site 89.

Site 89—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
Vertical and horizontal extent of soil contamination	Assess the vertical and horizontal extent of soil contamination Expedite the field investigation and decision process by using Level 2 analyses Confirm results of Level 2 analyses with Level 3 analyses Collect at least one TCL/TAL sample (location to be selected in the field) to assess whether other unknown contamination is present

Soil samples will be collected to assess the vertical and horizontal extent of soil contamination from past activities in Building 1089. Activities occurred inside the building, so the highest levels of contamination would be expected to be found along the building foundation where releases from the building would have occurred. Locations of releases are not known, so sampling locations are systematically spaced out along the foundation of the building.

Surface soil samples will be collected at 10 locations along the foundation of Building 1089. Samples will be collected as close to the foundation as possible at a depth of zero to 12 inches to assess whether a contaminant release has occurred. These soil sampling locations may be altered during the investigation if vegetative stress, staining, or other characteristics of a release are present. Sampling locations are shown in Figure 4-11. Each sample will be analyzed for Level 2 VOCs, metals, and pH.

Subsurface soil samples will be collected to assess the vertical extent of contamination. Four borings will be installed to a depth of 10 ft. Samples will be collected from 5 ft and 10 ft bgs and analyzed for Level 2 VOCs, metals, and pH. The boring locations shown in Figure 4-11 are preliminary. Soil borings will be adjusted to include areas where the highest level of surface soil contamination is encountered, and their locations will be determined in the field by the FTL or site hydrogeologist. One TCL/TAL sample will be collected based on field screening at the location of highest relative contamination.

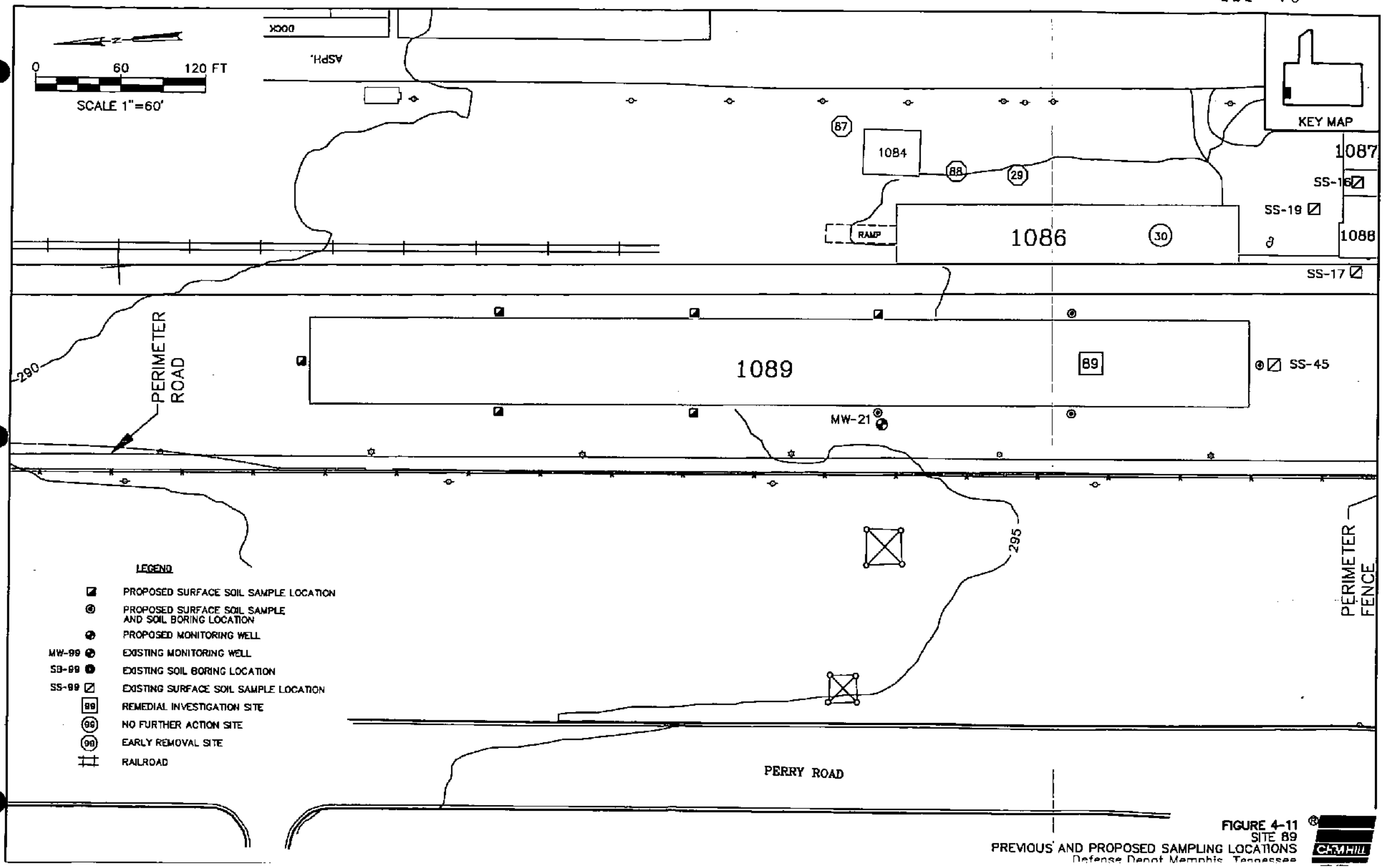


FIGURE 4-11
SITE 89
PREVIOUS AND PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.3.1 Site 51—Lake Danielson Outlet Storm Water Drainage Ditch

Storm water runoff from the surrounding areas constitutes most of the flow through this ditch. The ditch is normally dry and receives only intermittent flow from the lake and surrounding areas during periods of excessive precipitation. The lake was originally constructed to store water for fire-fighting purposes. Drawing 2 presents the location of the lake and the outlet storm water drainage ditch.

The drainage ditch is a 3-foot-wide concrete channel. It originates at the southern end of Lake Danielson and runs approximately 600 ft south to the installation's boundary.

Surface water samples (SW-9 and SW-12) taken from the drainage outfall during the *RI Report* (ref. 4) indicate the presence of pesticides and metals. MW-25, which is located approximately 60 ft east of the drainage inlet, indicates the presence of tetrachloroethene and metals. Tables B-5 and B-6 and Figure 4-12 present the historical data for the site. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are SVOCs, VOCs, pesticides, and metals.

The following summary block identifies the major data gaps and DQOs for Site 51.

Site 51—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Collect surface water and sediment samples to evaluate the presence of surface water and sediment contamination.
Insufficient data to evaluate extent of surface water and sediment contamination	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings will be installed to evaluate whether contamination is present at the site because of past activities at DDMT. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Three surface soil samples also will be collected to assist in identifying surface soil contamination. The sample locations were selected at the inlets, outlets, and where flow from another source enters the ditch. The sampling results from the locations should identify the contaminant source. A boring depth of 10 ft was selected because shallow soil contamination is the probable condition due to intermittent flow in the ditch.

Twelve soil samples (three borings, three samples from each boring, and three surface soil samples) will be collected and analyzed for VOCs, SVOCs, PAHs, pesticides, and metals using Level 2 analytical methods. One sample from a soil boring and one surface soil sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination.

After a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, three storm water samples and three sediment samples will be collected within 48 hours after the rainfall and analyzed for SVOCs, VOCs, pesticides, and metals. Water samples will be analyzed using Level 3 analytical methods. The biased sampling locations for the storm water drainage ditch are shown in Figure 4-13. The site will be reviewed during the field investigation to evaluate other sources of potential contamination. Samples (surface, subsurface, or sediment) will be collected at the additional source locations if they are identified in the field.

0 60 120FT

SCALE 1"=60'

KEY MAP

Parameter	(µg/kg)
Chloroform	2J
Toluene	6J
N-Nitrosodiphenylamine	340J
Total PAHs	13,010
Dieldrin	2900
As,Pb,Ba,Cr,Cu,Ni,Zn	

Parameter (ug/kg)	Phase I	Phase II	ESE 1993
Carbontetrachloride	2J		
Tetrachloroethene	8	7	11.2
N-Nitrosodiphenylamine	5J		
Pb,Hg,Sb,Ba,Cr,Cu,Ni,Zn			

NOTE: WATER AND SEDIMENT SAMPLES COLLECTED DURING USAEHA STUDY 32-24-0733-86. (REFERENCE 37)

285

290

285

SS-14

2ND STREET

N STREET

CHAINLINK FENCE

L STREET

VERY DENSE

MW-25

MW-25A

51

CONCRETE LINED CHANEL

LAKE DANIELSON

275

270

260

LEGEND

MW-99 EXISTING MONITORING WELL

SS-99 SURFACE SOIL SAMPLE LOCATION

99 SCREENING SITE

SITE AREA

SOURCE: RI REPORT, 1990

FIGURE 4-12
SITE 51
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

121 80

N

0 60 120FT

SCALE 1"=60'

KEY MAP

N STREET

CHAINLINK FENCE

285

290

285

SS-14

2ND STREET

275

VERY DENSE

L STREET

270

CONCRETE
LINED CHANEL

MW-25

MW-25A

LAKE
DANIELSON

51

275

270

280

LEGEND

- PROPOSED SOIL BORING
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED STORM WATER SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE
- MW-99 EXISTING MONITORING WELL
- SS-99 SURFACE SAMPLE LOCATION
- SCREENING SITE
- SITE AREA

NOTE: SEDIMENT SAMPLING WILL OCCUR BENEATH CONCRETE LINER. CONCRETE CORING WILL BE CONDUCTED TO ACCESS SEDIMENTS.

FIGURE 4-13
SITE 51
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.3.2 Site 52—Golf Course Pond Outlet Ditch

This ditch is a 3-foot-wide concrete channel, approximately 700 ft long, and runs south from the south end of the Golf Course Pond to the installation's boundary (Drawing 2). It is normally dry, receiving intermittent flow during periods of heavy precipitation.

Two surface water samples (SW-10 and SW-11) were collected and analyzed from this drainage channel during the *RI Report* (ref. 4). Metals and pesticides were detected in both samples. The surface soil sample taken on the western side of the inlet also indicated the presence of PAHs (Table B-6 and Figure 4-14). On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are PAHs, pesticides, and metals.

The following summary block identifies the major data gaps and DQOs for Site 52.

Site 52—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Collect surface water and sediment samples to evaluate the presence of surface water and sediment contamination.
Insufficient data to evaluate extent of surface water and sediment contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings (biased) will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Five additional surface soil samples will be collected to assist in delineating the surface soil contamination. The sample locations (Figure 4-15) were selected at the inlets, outlets, and where flow from another source enters the ditch. The sampling results from the locations should identify the contaminant source. A boring depth of 10 ft was selected because shallow soil contamination is the probable condition due to intermittent flow in the ditch.

Eleven samples (two borings, three samples per boring, and five surface soil samples) will be collected and analyzed for PAHs, pesticides, and metals. One sample from a boring and a surface soil sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining confirmational sample.

After a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, two storm water samples and two sediment samples will be collected within 48 hours after the rainfall and analyzed for PAHs, pesticides, and metals using Level 3 analytical methods. Site 52 will be reviewed during the field investigation to evaluate other sources of potential contamination. Samples (surface, subsurface, storm water, or sediment) will be collected at other source locations depending on the character of the source.

121 83

0 60 120FT

SCALE 1"=60'

1ST STREET

PARKING

TENNIS

BASKETBALL

KEY MAP

Parameters	(µg/kg)
Toluene	17
Total PAHs	560
4,4' DDE	2000
4,4' DDT	870
Dieldrin	760
As,Pb,Hg,Ba,Cr,Cu,Ni,Zn	

Parameters	(µg/kg)
Toluene	9J
Total PAHs	3,260
4,4' DDE	340
4,4' DDT	290
Dieldrin	830
Ba,Cr,Cu,Ni,Zn,As,Pb	

Parameters	(µg/kg)
Total Xylenes	1J
4,4'-DDT	1.9
Pb,Ba,Cu,Zn	

Parameters	(µg/kg)
4,4'-DDT	0.27
Ba,Cu,Zn	

CONCRETE LINED CHANEL

SS-12 SS-13 SW-11 SW-10

52

295 290 285 275 270 265 195

LEGEND

SS-99 SURFACE SOIL SAMPLE LOCATION

SW-99 SURFACE WATER SAMPLE LOCATION

99 SCREENING SITE

SITE AREA

SOURCE: RI REPORT,1990

MSS-0014.DWG 11-Oct-1995

FIGURE 4-14
SITE 52
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

121 84

0 60 120FT

SCALE 1"=60'

1ST STREET

PARKING

TENNIS

BASKETBALL

295

285

275

195

KEY MAP

POND

SS-12

SS-13

52

270

CONCRETE LINED CHANEL

SW-11

SW-10

265

290

LEGEND

- PROPOSED SOIL BORING
- PROPOSED STORM WATER SAMPLE LOCATION
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- PROPOSED SEDIMENT SAMPLE
- SS-99 SURFACE SOIL SAMPLE LOCATION
- SW-99 SURFACE WATER SAMPLE LOCATION
- 99 SCREENING SITE
- SITE AREA

NOTE: SEDIMENT SAMPLING WILL OCCUR BENEATH CONCRETE LINER. CONCRETE CORING WILL BE CONDUCTED TO ACCESS SEDIMENTS.

FIGURE 4-15
SITE 52
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.3.3 Site 65—XXCC-3, Building 249

Building 249 formerly was used as a storage facility for clothing treated with impregnite, a chemical used as a preventive to the effects of chemical warfare agents on skin. The impregnite (XXCC-3) was produced by mixing CC-2, a chemical produced by E. I. Dupont Nemours during the 1940s and 1950s, with ZnO. CC-2 (sym. dichlor-bis(2,4,6 trichlorphenyl)urea), a labile (unstable) organic compound, indicates the complexity with analytical measurement because of the compound's instability. The results of SVOC analysis are used to evaluate whether refractory organics are present that could have resulted from the breakdown of the structure of the urea. In particular, semivolatile chlorinated phenyl compounds and chlorinated aromatics may be present if the structure has undergone degradation.

Building 249, situated between 1st and 2nd Streets and between E and F Streets, is displayed in Drawing 2. No known releases have occurred at this site. On the basis of the description provided for this site and the known potential for contamination at the facility, the PCOCs are SVOCs and zinc.

The following summary block identifies the major data gaps and DQOs for Site 65.

Site 65—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Five additional surface soil samples also will be collected to possibly identify the surface soil contamination (Figure 4-16). The sample locations were selected near doorways because the stored materials were loaded and unloaded in the area. A boring depth of 10 ft was selected because shallow soil contamination is the probable condition due to possible surface spills during loading and unloading operations.

Fourteen samples (three borings, three samples per boring, and five surface soil samples) will be collected and analyzed for SVOCs and zinc using Level 2 analytical methods. One sample from a boring and a surface soil sample will be sent to an FBL for

confirmational sampling (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining confirmational sample.

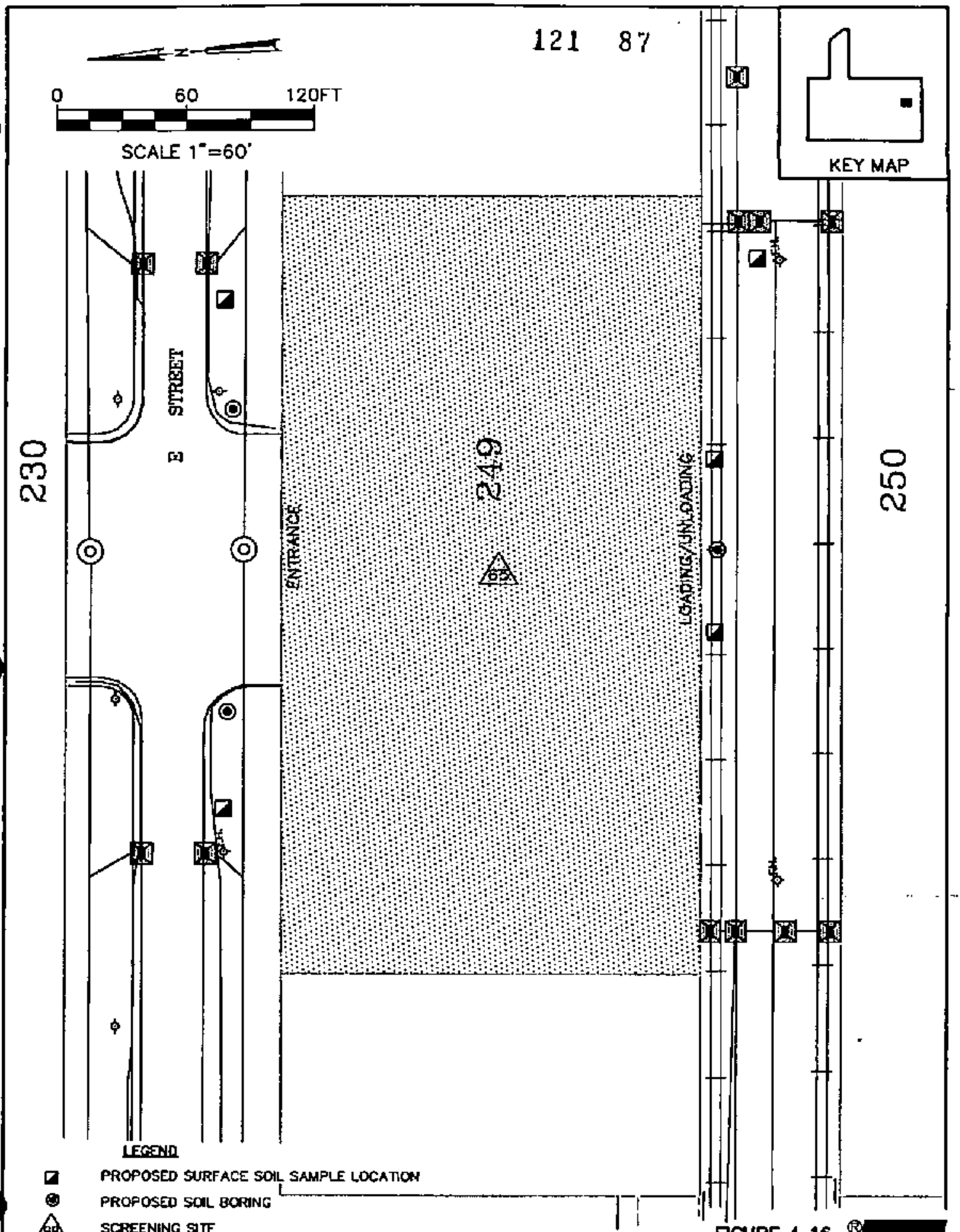


FIGURE 4-16
SITE 65
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0021.DWG 11-Oct-1995

4.3.4 Site 66—POL Building 253

Operations at Building 253 (Drawing 2) consisted mainly of motor pool services (minor maintenance, oil changes, steam cleaning, cold solvent degreasing, washing, and lubrication). Additionally, a 5,000-gallon underground storage tank (UST) containing No. 4 fuel oil was located at this site.

This building, approximately 50 by 125 ft, is located in the Facility Engineering maintenance yard. No sampling data exist for this site. On the basis of motor pool activities performed at this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, and PAHs.

The following summary block identifies the major data gaps and DQOs for Site 66.

Site 66—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to subsurface soils	Collect surface soil samples to evaluate the presence of a contaminant release. Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings will be used to evaluate whether contamination exists at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, 20 ft, and 40 ft. Extensive surface soil sampling will not be collected because of the presence of asphalt. However, one surface soil sample will be collected at the drainage outfall near the UST mentioned above. Additionally, two background samples will be collected below the asphalt at this site and analyzed for PAHs and SVOCs at depths of zero to 12 inches below the asphalt and at the 5-foot depth. This sample can be compared to surface samples collected around the area (Site 67) and can aid in assessing whether contaminants are present at the surface because of the asphalt. The sample locations shown in Figure 4-17 were selected because these areas are where the motor pool operations are heaviest around the building. A boring depth of 40 ft was selected because of the possible release that may have occurred from the UST located at the site.

Eighteen samples (three borings, five samples per boring, two background samples, and one surface soil sample) will be collected and analyzed in the field for PAHs using Level 1 analytical methods. Additional analyses for the samples include VOCs and SVOCs using Level 2 analytical and reporting methods. On the basis of field screening results,

one sample from two borings with the highest amount of relative contamination will be sent to an FBL for confirmational, VOC, and SVOC analysis using Level 3 analytical and reporting methods (two samples). Additionally, a TCL/TAL will be conducted on the sample with the highest field screening results. One surface soil sample will be collected at the drainage outfall from this area and analyzed for TCL/TAL.

0 60 120FT

SCALE 1"=60'

NOTE: BACKGROUND SAMPLE TO BE COLLECTED AT 5 FT. BELOW THE ASPHALT.

252

CONC.

260

270

121 90

SS-37

SS-50

T273

59

KEY MAP

ASPH.

30

41

253

66

40

T272

DRAINAGE OUTFALL

295

ASPH.

T254

T256

67

BUILDING 257

SS-25

Parameters	(ug/kg)
PAHs	769
Dieldrin	36
As,Pb,Hg,Sb,Ba,Cr,Cu,Ni,Zn	

58

267

269

LEGEND

- PROPOSED SOIL BORING
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- MW-99 EXISTING MONITORING WELL
- SS-99 SURFACE SAMPLE LOCATION
- 00 SCREENING SITE
- 99 NO FURTHER ACTION SITE
- 98 REMEDIAL INVESTIGATION SITE
- SITE AREA

SS-31

CONSTRUCTION

274

48

CONSTRUCTION

CONSTRUCTION

K STREET

MW-26

SS-30

2ND STREET

SOURCE: RI REPORT, 1990

FIGURE 4-17
SITES 66, 67, AND 68
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.3.5 Site 67—Installation Gas Station, Building 257 121 91

Since 1942, fuel dispensing and storage have been ongoing at Site 67. The original steel USTs were removed in 1984 (two tanks) and 1989 (one tank) and replaced with fiberglass tanks in 1985. All tanks stored gasoline (leaded and unleaded).

Building 257 is east of Building 359 at the intersection of G and 2nd Streets (Drawing 2).

One surface soil sample (SS-25) taken west of Building 257 during the *RI Report* (ref. 4) indicated the presence of PAHs, dieldrin, and metals (Table B-7 and Figure 4-17). Pesticides (dieldrin) are being investigated facilitywide as part of Site 73, all grassed areas. On the basis of the previous sampling data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, PAHs, and metals.

The following summary block identifies the major data gaps and DQOs for Site 67.

Site 67—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
Delineate the extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Biased sampling locations were selected for this site to evaluate the possibility of existing contamination. Therefore, two soil borings will be installed at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, 20 ft, and 40 ft. Two surface soil samples will be collected in addition to the soil boring samples. These sample locations were chosen based on fuel dispensing activities conducted at the site such as vehicle fueling areas, UST filling areas, and the past sample location that revealed the presence of contamination. A boring depth of 40 ft was selected because of the possible releases that may have occurred from the USTs present at the site.

Twelve samples (two borings, five samples per boring, and two surface soil samples) will be collected and analyzed for PAHs in the field (Level 1). Additional analyses on the samples include VOCs and metals using Level 2 analytical and reporting methods. On the basis of field screening results, one sample from each boring with the highest relative amount of contamination will be sent to an FBL for confirmational, VOC, and PPM

analysis using Level 3 analytical and reporting methods (two samples). Additionally, a TCL/TAL will be conducted on the sample with the highest field screening results.

4.3.6 Site 68—POL Building 263

121 93

Building 263, which is presented in Drawing 2, has been used as an attendants' room for the dispensing of petroleum, oil, and lubricants (POL) to vehicles since the 1940s.

The site is located 500 ft southwest of Gate 1 and 900 ft north of the southern installation boundary. Building 263 is approximately 20 ft by 40 ft and is surrounded on all sides by a large expanse of asphalt pavement (see Figure 4-17).

No sampling data exist specifically for this site. The site historically has been used for the storage of small containers of lubricants and oils. These materials are dispensed to the POL staff and are not used in the Building 263 area. Because materials were stored inside, the building is surrounded by asphalt pavement, and no releases are known to have occurred, there is little potential for contamination resulting from past practices at this site. The PCOCs for the site are VOCs and SVOCs.

The following summary block identifies the major data gaps and DQOs for Site 68.

Site 68—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
Assess the presence of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data.

Two biased, field-selected locations will be used for soil borings to a depth of 10 ft. Samples will be collected from the borings at depths of 5 ft and 10 ft. Samples will be analyzed using Level 2 analytical protocols for PAHs. The depth of the borings was based on the limited potential for subsurface contamination as a result of asphalt coverage at the site. No TCL/TAL analyses will be conducted at this site (see Figure 4-17).

4.3.7 Site 69—Flamethrower Liquid Fuel Application

Site 69 was primarily used to test flamethrower fuels. Flamethrowers were tested using diesel fuel. Fire fighting techniques also were practiced at this site after ignition of the fuel. The site is currently used as a golf course (Drawing 2). It is located on the eastern side of the installation, approximately 100 ft east of Lake Danielson.

On the basis of the known potential for contamination posed by flamethrower activities at the facility, the PCOCs are PAHs.

The following summary block identifies the major data gaps and DQOs for Site 69.

Site 69—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
Assess the presence of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Two biased soil borings (Figure 4-18) will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Four surface soil samples will be collected to evaluate the presence of contamination. The sample locations were selected based on past knowledge of the locations where flame throwing activities were conducted. A boring depth of 10 ft was selected because the site was used for surface ignition of diesel fuel and surface and shallow soil contamination is the probable condition.

Ten samples (two borings, three samples per boring, and four surface soil samples) will be collected and analyzed for PAHs using Level 2 analytical methods. One sample from a boring will be sent to an FBL for confirmational TCL/TAL analysis. The TCL/TAL will be run on the sample with the highest relative amount of contamination (based on field screening methods).

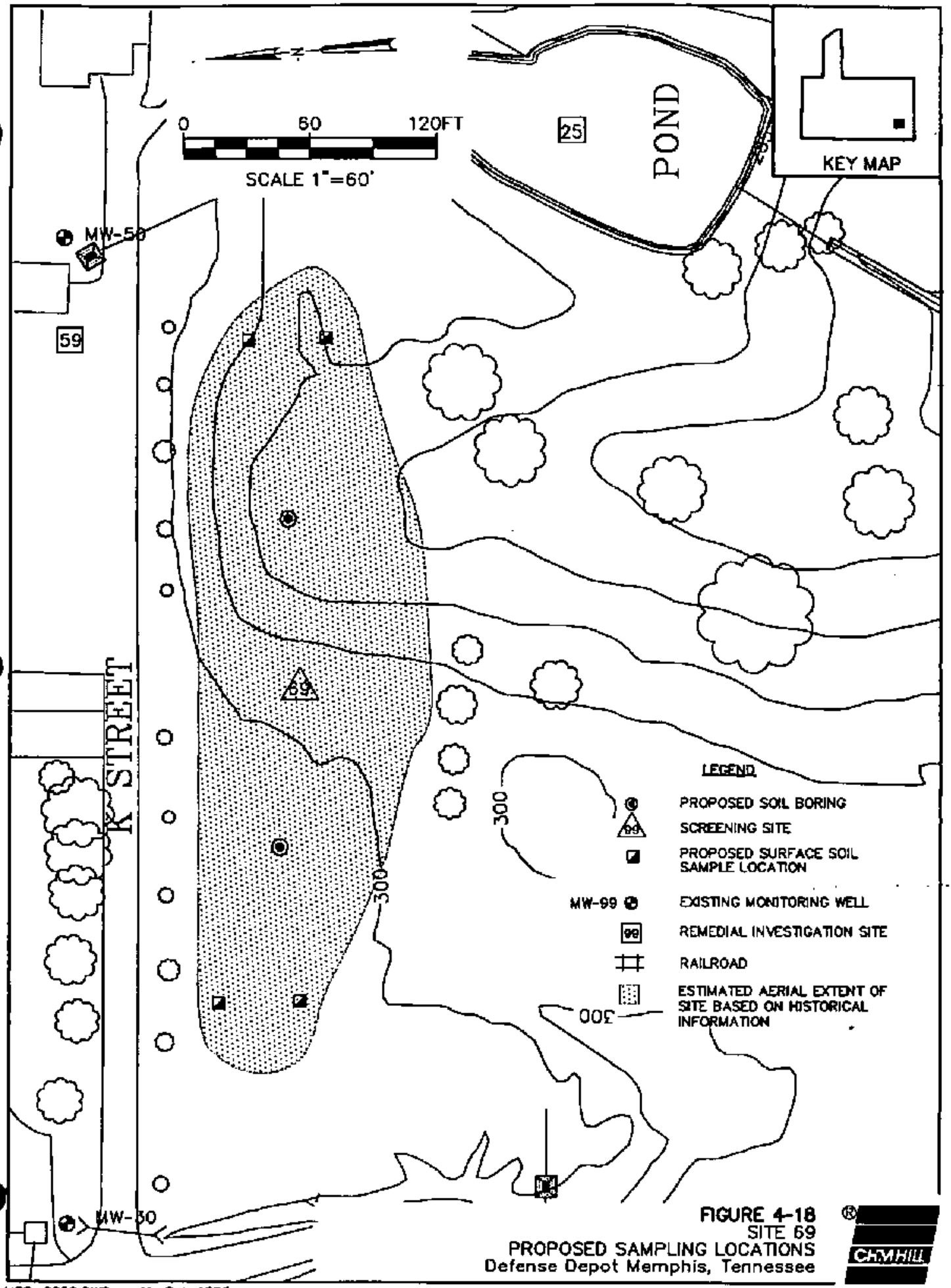


FIGURE 4-18
SITE 69
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0050.DWG 11-Oct-1995

4.3.8 Site 73—2,4-Dichlorophenoxyacetic Acid (all grassed areas)

Pesticides have been found throughout DDMT, as supported by the analytical results from previous studies conducted at DDMT. DDMT concedes that pesticide contamination exists basewide (Figure 4-19) and is a result of direct application, not a release. DDMT recommends that Site 73 not be investigated further, with future actions (institutional controls, remediation, and so forth) being evaluated during the FS that will be conducted for the facility. This recommendation does not preclude further investigations of potential migration pathways, accumulation areas, and unknown contaminant release areas (such as drainage pathways).

Also, additional information regarding potential pesticide contamination will be evaluated at every screening site. At least one sample from every screening site will be analyzed for TCL/TAL parameters. Pesticides are included in this list. Locations where unknown hazardous materials were stored also will be sampled for pesticides.

These areas are specifically addressed in this SSFSP. All samples collected in drainage pathways will be analyzed for pesticides. If contamination is present in drainage pathways, the grassed areas will be considered as a potential source because of storm water runoff.

0 500 1000FT
SCALE 1"=500'

N

OU-4

OU-3

OU-2

Parameter	(µg/kg)
4,4'-DDE	14
4,4'-DDT	79
∝ Chlordane	33
δ Chlordane	53

Parameter	(µg/kg)
4,4'-DDT	51
Dieldrin	130

Parameter	(µg/kg)
4,4'-DDE	21
4,4'-DDT	130

Parameter	(µg/kg)
4,4'-DDE	250
4,4'-DDT	1400

Parameter	(µg/kg)
4,4'-DDD	260
4,4'-DDE	1100
4,4'-DDT	5900
Endosulfan Sulfate	360

Parameter	(µg/kg)
Dieldrin	65

Parameter	(µg/kg)
4,4'-DDD	24
4,4'-DDE	150
4,4'-DDT	250
Dieldrin	120

Parameter	(µg/kg)
4,4'-DDD	50
4,4'-DDE	120
Dieldrin	78

Parameter	(µg/kg)
4,4'-DDD	490
4,4'-DDE	1800

Parameter	(µg/kg)
4,4'-DDD	85
4,4'-DDE	210
Dieldrin	160

Parameter	(µg/kg)
4,4'-DDD	180
4,4'-DDE	660
Dieldrin	220

Parameter	(µg/kg)
4,4'-DDE	33
4,4'-DDT	90
∝ Chlordane	25
δ Chlordane	31

Parameter	(µg/kg)
4,4'-DDD	52
4,4'-DDE	97
4,4'-DDT	260

Parameter	(µg/kg)
4,4'-DDD	13
4,4'-DDE	27
4,4'-DDT	110

Parameter	(µg/kg)
4,4'-DDD	45
4,4'-DDE	110
4,4'-DDT	450

Parameter	(µg/kg)
4,4'-DDE	400
4,4'-DDT	1100

Parameter	(µg/kg)
4,4'-DDD	250
4,4'-DDE	1300
4,4'-DDT	1400

Parameter	(µg/kg)
4,4'-DDD	10
4,4'-DDE	17
4,4'-DDT	52

Parameter	(µg/kg)
4,4'-DDD	2100
4,4'-DDE	4500
4,4'-DDT	6700
∝ Chlordane	4000
Dieldrin	240
δ Chlordane	4000
Haptachlor	120
Heptachlor Epoxide	250

Parameter	(µg/kg)
4,4'-DDD	3600
4,4'-DDE	39000
4,4'-DDT	59000
Endrin Ketone	12000
δ Chlordane	2400

Parameter	(µg/kg)
4,4'-DDD	1400
4,4'-DDE	9000
4,4'-DDT	7900
β-BHC	1800
δ Chlordane	620
Methoxychlor	1500

Parameter	(µg/kg)
4,4'-DDE	290
4,4'-DDT	1500

Parameter	(µg/kg)
4,4'-DDD	320
4,4'-DDE	2500
4,4'-DDT	710
Dieldrin	4500

Parameter	(µg/kg)
Dieldrin	36

Parameter	(µg/kg)
4,4'-DDE	18
4,4'-DDT	190

Parameter	(µg/kg)
4,4'-DDE	78
4,4'-DDT	1000

Parameter	(µg/kg)
4,4'-DDE	1200
4,4'-DDT	4000
Dieldrin	1400

Parameter	(µg/kg)
4,4'-DDE	4300
4,4'-DDT	3000
Dieldrin	3800
β-BHC	2500

Parameter	(µg/kg)
4,4'-DDE	2000
4,4'-DDT	870
Dieldrin	760

Parameter	(µg/kg)
4,4'-DDE	340
4,4'-DDT	290
Dieldrin	830

Parameter	(µg/kg)
Dieldrin	2900

SS-1 ND
SS-2
SS-3
SS-4
SS-5
SS-6
SS-7
SS-8
SS-9
SS-10
SS-11
SS-12
SS-13
SS-14
SS-15
SS-16
SS-17
SS-18
SS-19
SS-20
SS-21
SS-22
SS-23
SS-24
SS-25
SS-26 ND
SS-27 ND
SS-28 ND
SS-29 ND
SS-30 ND
SS-31
SS-32 ND
SS-33 ND
SS-34 ND
SS-35 ND
SS-36 ND
SS-37
SS-38 ND
SS-39 ND
SS-40 ND
SS-41
SS-42
SS-43
SS-44
SS-45
SS-46
SS-47
SS-48
SS-49 ND
SS-50

LEGEND

- SURFACE SOIL SAMPLE LOCATION
- ND NOT DETECTED
- RAILROAD

FIGURE 4-19
SITE 73
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

4.3.9 Site 75—Unknown Wastes near Building 689

Building 689 was a temporary storage facility for flammable liquids such as alcohols, ketones, aromatics, and esters. The area was not bermed, and is adjacent to a storm sewer inlet. Site 75 is situated in the southern portion of the Main Installation between Buildings 689 and 670, off K Street, as displayed in Drawing 2.

No sampling data were taken specifically for this site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs and SVOCs.

The following summary block identifies the major data gaps and DQOs for Site 75.

Site 75—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings (at biased locations) will be used to evaluate whether contamination is present at the site. Two additional surface soil samples also will be collected at this site in biased locations. Samples from borings will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Figure 4-20 presents the proposed sample locations. The sample locations were selected based on the loading and unloading areas around the building and the storm water drainage pathways. These locations are most likely to show the presence of contamination, if present. A boring depth of 20 ft was selected because surface and shallow soil contamination are the probable condition.

Ten samples (two borings, four samples per boring, and two surface soil samples) will be collected and analyzed for SVOCs and VOCs using Level 2 analytical methods. One sample from each a boring will be sent to an FBL for confirmational TCL/TAL analysis. On the basis of field screening results, the TCL/TAL will be run on the sample with the highest relative amount of contamination as determined from field screening techniques. One surface soil sample will be collected at the outfall location of drainage from this area and analyzed for TCL/TAL.

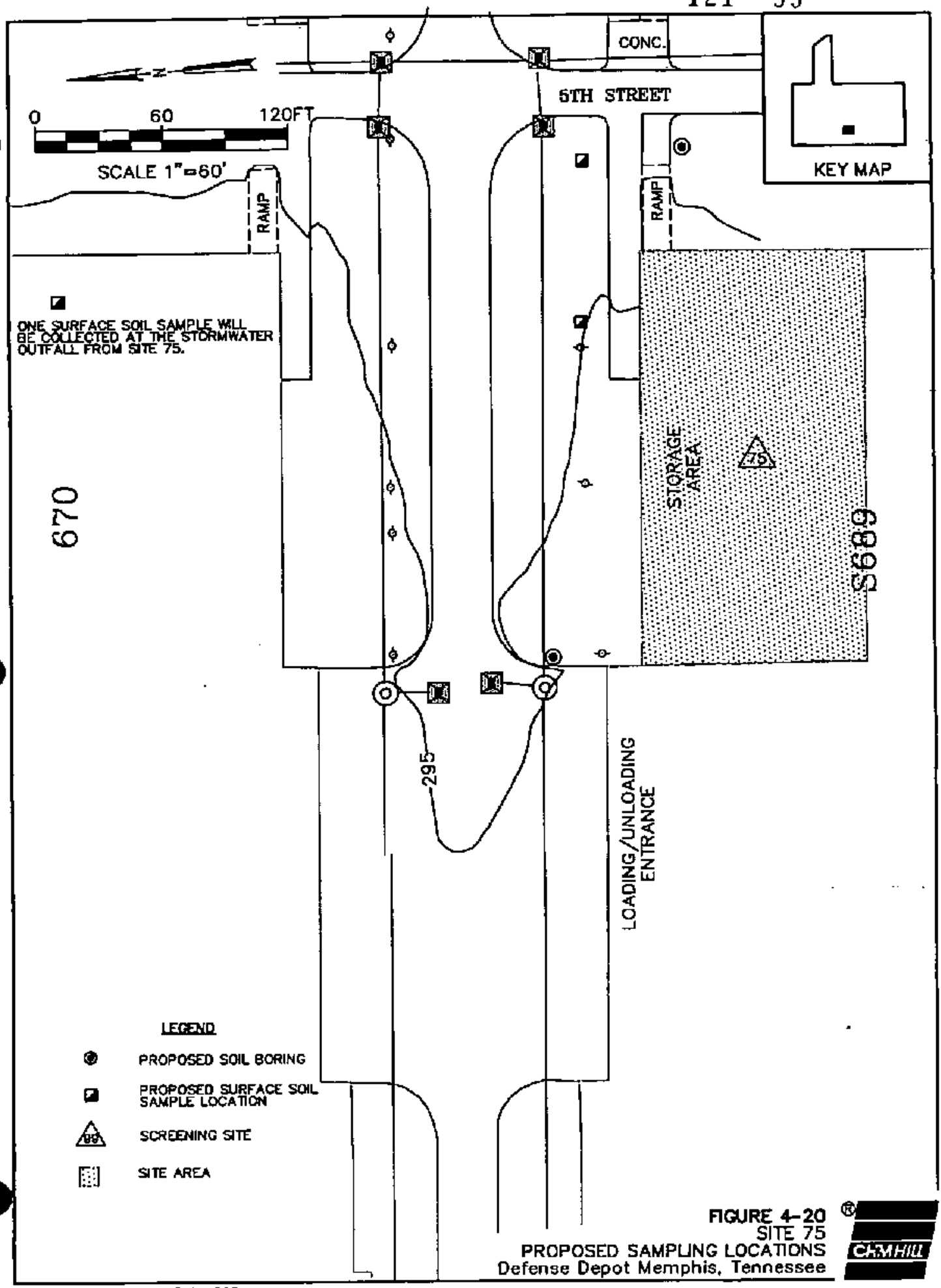


FIGURE 4-20
SITE 75
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0010.DWG 11-Oct-1995

4.3.10 Site 76—Unknown Wastes near Building 690

In the past, this warehouse, which is shown in Drawing 2, has been used to store hazardous materials before shipment. Building 690 is located in the southwestern portion of OU-3, near 5th and M Streets.

No sampling data have previously been collected specifically for this site. Therefore, sampling locations will be biased so that the presence of contamination can be assessed at the site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 76.

Site 76—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use TCL/TAL analysis because of the unknown wastes managed at this location.

Three soil borings will be used to evaluate whether contamination is present. Samples will be collected at depths of zero to 12 inches, 5 ft, and 20 ft. Figure 4-21 presents the proposed sample locations. These sample locations were selected based on activities conducted around the building such as loading and unloading operations and storm water drainage areas. A boring depth of 20 ft was selected because surface and shallow soil contamination is the probable condition.

Nine samples (three borings, three samples per boring) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. One sample from a boring will be sent to an FBL for confirmational TCL/TAL analysis. The TCL/TAL will be run on the sample with the highest relative amount of contamination as determined from field screening techniques.

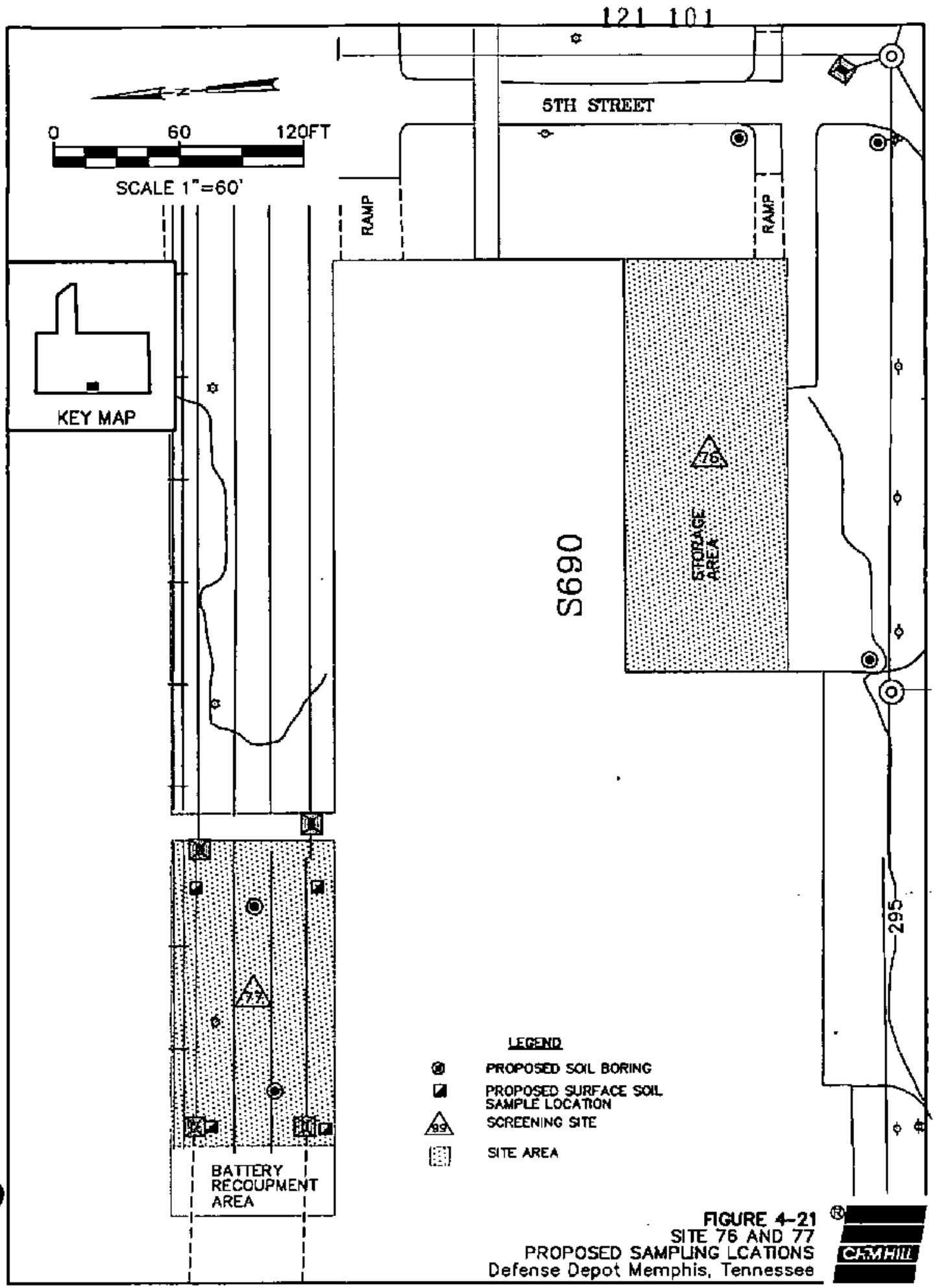


FIGURE 4-21
SITE 76 AND 77
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0011.DWG 11-Oct-1995

4.3.11 Site 77—Unknown Wastes near Buildings 689 and 690

This warehouse may have stored or shipped hazardous materials in the past (Drawing 2). Also, a battery recoupment area exists immediately within the area between the two buildings. This site is located between Buildings 689 and 690 off L Street. Figure 4-21 shows the site location.

No sampling data have previously been collected specifically for this site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, pH, and metals.

The following summary block identifies the major data gaps and DQOs for Site 77.

Site 77—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use TCL/TAL data because of the unknown wastes managed in the area.

Two soil borings (biased) will be installed to evaluate whether contamination at the site is present because of past practices. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Additionally, four surface soil samples will be collected at the site (Figure 4-21). Sample locations were selected at biased locations to evaluate whether a release has occurred from the site. A boring depth of 20 ft was selected because surface and shallow soil contamination is the probable condition.

Twelve samples (two borings, four samples per boring, and four surface soil samples) will be collected and analyzed for VOCs, SVOCs, pesticides, pH, and PPMs using Level 2 analytical methods. One sample from each boring will be submitted to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational samples.

4.3.12 Site 78—Alcohol, Acetone, Toluene, and Hydrofluoric Acid Area, Building 689

Drawing 2 shows Building 689, which has historically stored alcohol, acetone, toluene, and hydrofluoric acid before transport. Site 78 is located on the eastern side of OU-3 at the intersection of 6th and K Streets.

No sampling data have previously been collected specifically for this site. Therefore, a biased sampling approach is proposed. On the basis of the past practices conducted at this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, fluoride, pH, and metals.

The following summary block identifies the major data gaps and DQOs for Site 78.

Site 78—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Four soil borings, shown in Figure 4-22, will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 20 ft. These sample locations were selected based on the operations conducted at the building (loading and unloading activities) and storm water drainage pathways; thus, the locations are biased. A boring depth of 20 ft was selected because surface and shallow soil contamination is the probable condition.

Twelve samples (four borings, three samples each) will be collected and analyzed for VOCs, SVOCS, fluorides, pH, and metals, using Level 2 analytical methods. One sample from two of the borings will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational sample.

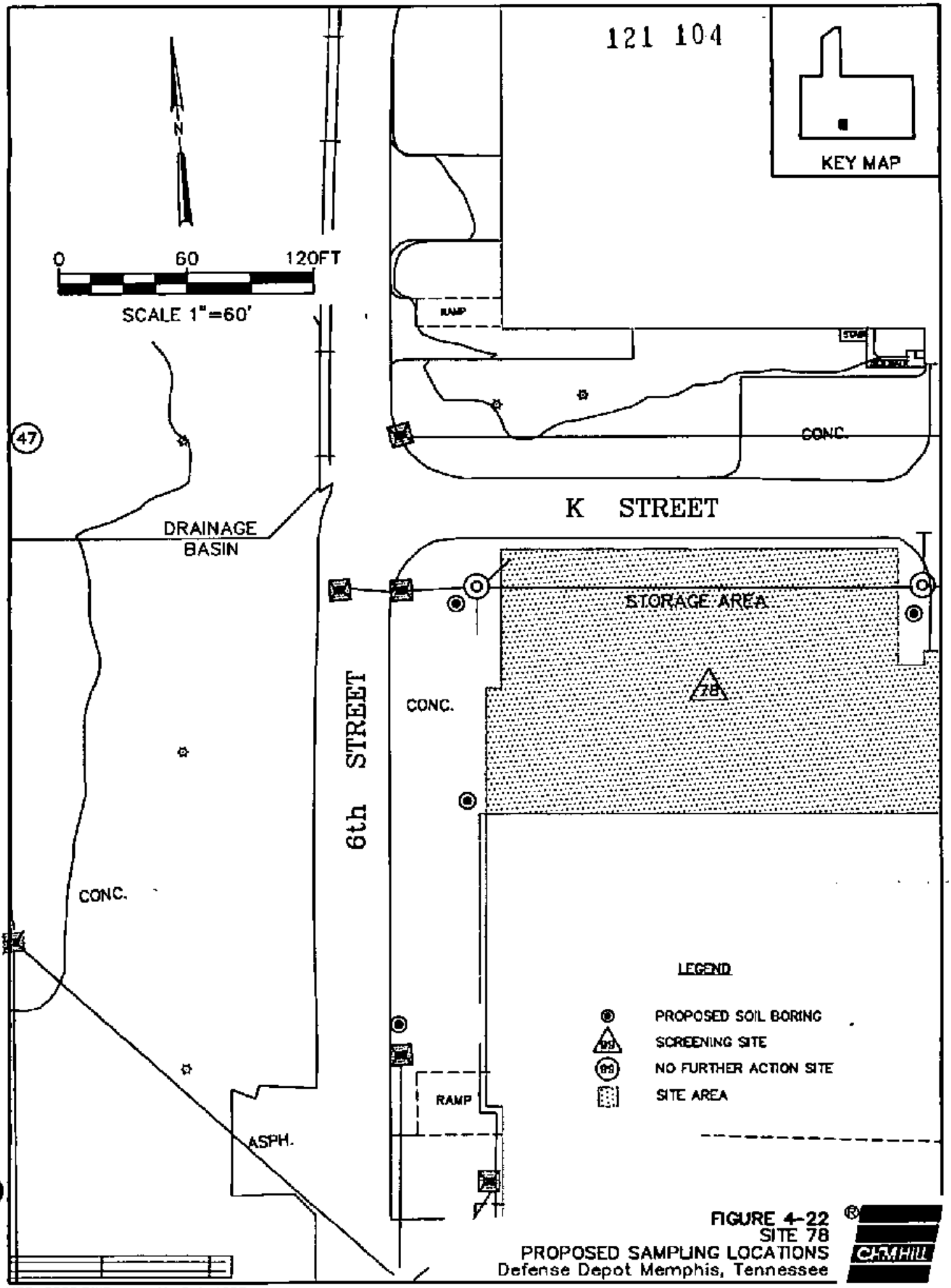


FIGURE 4-22
SITE 78
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MS5-0008.DWG 11-Oct-1995

4.4 OU-4 Screening Sites

4.4.1 Site 28—Building 865

The Recoup Area Building (Building 865) is a hazardous materials and waste handling area. The area is used to transfer materials from damaged or leaking containers into undamaged containers, and has been in continual use since 1986. The area north of Building 865 has historically been used as an open storage area (Drawing 2).

Site 28 is situated 115 ft west of 10th Street and 180 ft north of G Street. Building 865 is constructed of concrete block, with a poured concrete floor that has a chemical-resistant coating. The materials are placed in separate bays to segregate materials; bays are bermed to contain spills during repackaging or from leaking containers.

No sampling data have previously been collected specifically for this site. On the basis of practices performed at this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 28.

Site 28—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Collect samples for TCL/TAL analysis because of the possible range of contaminants at this site.

Three soil borings will be installed at biased locations to evaluate whether contamination is present. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Two surface soil samples will be collected in addition to the soil boring samples (Figure 4-23). The sample locations were selected based on activities conducted at the building such as loading, unloading, and repackaging areas. The 10-foot boring depth was selected because surface and shallow soil contamination is the probable condition.

Eleven samples (three borings, three samples per boring, and two surface soil samples) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. One sample from a boring and one surface soil sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining confirmational samples.

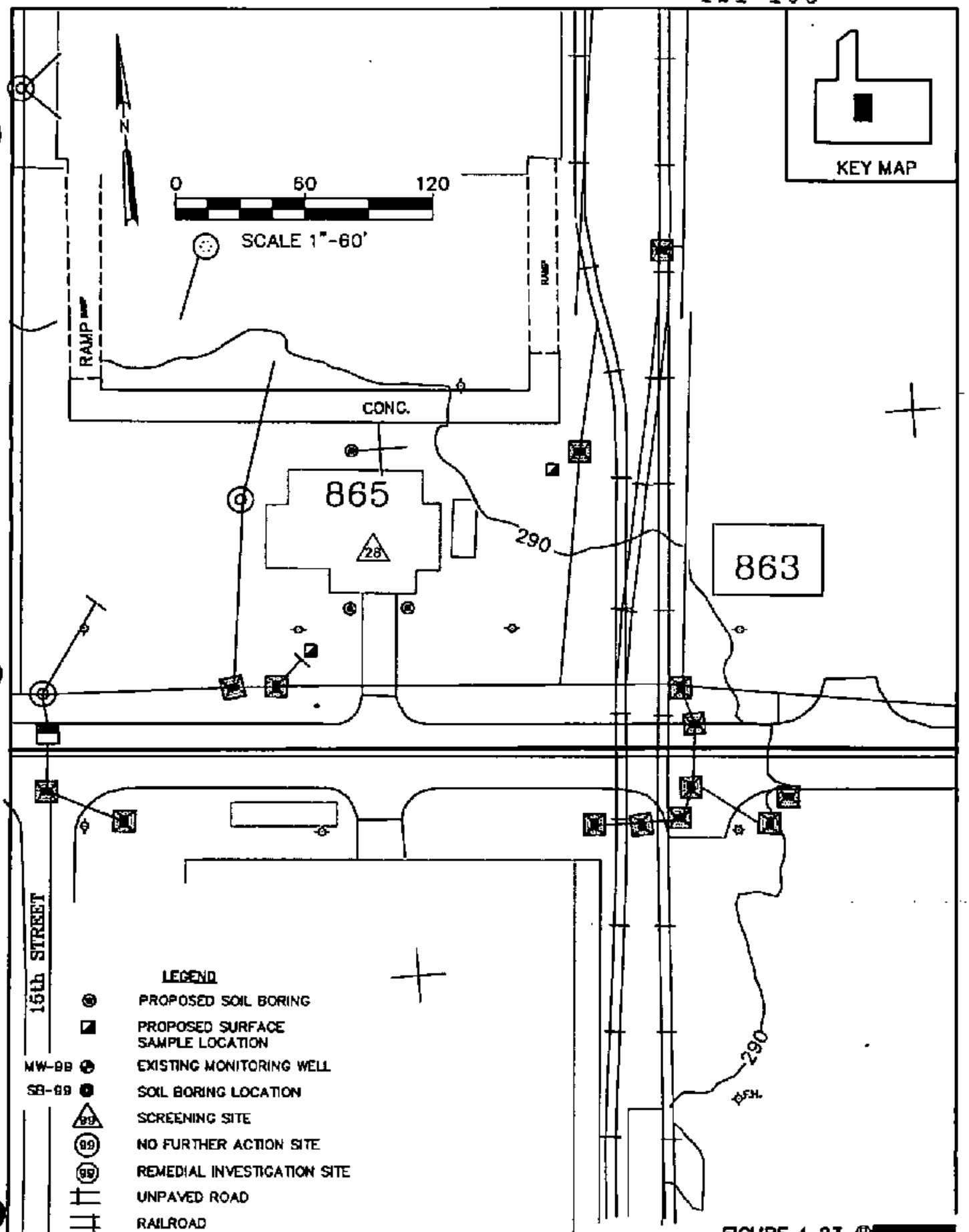


FIGURE 4-23
SITE 28
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

MSS-0056.DWG 11-Oct-1995

4.4.2 Site 35—DRMO Building, T-308 Hazardous Waste Storage

Building T-308 is a roofed, tin-sided shed with an unlined concrete floor. It has a 2-foot-high concrete berm/foundation on all four sides with 3-inch concrete or asphalt dikes at the entrances. Wastes are segregated and stored on pallets; however, there is no berming between waste types.

Drawing 2 shows Site 35 in the northeastern corner of the Main Installation, south of Dunn Avenue.

A surface soil sample (SS-4) was collected about 100 ft downslope from this site during the *RI Report* (ref. 4); the sample indicated the presence of PAHs, dieldrin, and metals (Table B-9 and Figure 4-24). On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 35.

Site 35—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soils	Collect samples for one TCL/TAL analysis.

Three soil borings (biased) will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. The boring locations will be adjusted based on field observations (vegetative stress or noticeable staining). Figure 4-24 presents the location map and existing sampling data; Figure 4-25 presents the proposed sampling locations. The sampling locations were selected based on the areas of waste storage, evidence of vegetative stress or noticeable staining, and previous sampling results. Boring depths of 20 ft were selected because of evidence of contamination previously detected at the site, which suggests a possible contaminant release to the subsurface soils as the probable condition.

Twelve samples (three borings, four samples each boring) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. One sample from a boring and one surface sample will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analytical methods (for PCOCs) will be conducted on the remaining sample.

0 60 120FT

SCALE 1"=60'

N

DUNN AVENUE

121 108

KEY MAP

Parameter	(µg/kg)
Total PAHs	200
Dieldrin	65
Ba,Cd,Cr,Ni,As,Pb,Hg,Cu,Zn	

Parameter	(µg/kg)
Toluene	2J
Total PAH's	92990
4,4'-DDD	260
4,4'-DDE	1100
4,4'-DDT	5900
Endosulfansulfate	360
Ba,Cd,Cr,Ni,As,Pb,Hg	

B STREET

LEGEND

SS-99 SURFACE SOIL SAMPLE LOCATION

SCREENING SITE

REMEDIAL INVESTIGATION SITE

ESTIMATED AERIAL EXTENT OF SITE BASED ON HISTORICAL INFORMATION

SOURCE: RI REPORT, 1990

FIGURE 4-24
SITES 35, 36, 37, 38, 39, AND 54
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

MSS-0018.DWG 11-Oct-1995

DUNN AVENUE

PERIMETER ROAD

B STREET

121 109

KEY MAP

S308

S309

DOOR

DOOR

DOCK

CONC.

CONC.

SS-4

SS-5

35

36

37

38

39

54

300

295

305

LEGEND

- PROPOSED SOIL BORING
- PROPOSED STORM WATER SAMPLING LOCATION
- PROPOSED SEDIMENT SAMPLE
- PROPOSED SURFACE SOIL SAMPLE LOCATION
- SS-99 SURFACE SOIL SAMLE LOCATION
- 99 SCREENING SITE
- RAILROAD
- ESTIMATED AERIAL EXTENT OF SITE BASED ON HISTORICAL INFORMATION

N

0 120FT

SCALE 1"=60'

FIGURE 4-25
SITES 35, 36, 37, 38, 39, AND 54
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

CH2MHILL

4.4.3 Sites 36, 37, 38, and 39

121 110

Sites 36, 37, 38, and 39 are located in the northeastern section of the Main Installation and make up an area of approximately 2.5 acres (Drawing 2). Drums containing hazardous materials were stored at these sites until shipment to a licensed hazardous waste disposal facility occurred. Some areas consist of empty, damaged drums that may contain hazardous waste and POL residues.

One surface soil sample (SS-5) was collected adjacent to the concrete pad at Site 36 during the *RI Report* (ref. 4); the sample indicated the presence of PAHs, dieldrin, and metals (Table B-9 and Figure 4-24). On the basis of data provided for these sites and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, PPMs, and pesticides. The following summary block identifies the major data gaps and DQOs for Sites 36, 37, 38, and 39.

Sites 36, 37, 38, and 39—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if release has occurred to subsurface soil	Collect samples for TCL/TAL analyses.

Fourteen soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. A biased approach will be used for the site and was selected to evaluate the presence of a release. The boring depth of 20 ft was selected because surface and shallow soil contamination is the probable condition.

Fifty-six samples will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. On the basis of the field screening results, a TCL/TAL will be run on the two samples with the highest amount of relative contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining four confirmational samples.

4.4.4 Site 42—Former PCP Dip Vat Area

This vat was used to hold pentachlorophenol (PCP) for treating wood pallets. The site is located near Building 737 (Drawing 2), and is 275 ft west of 6th Street. PCP inherently contains dioxins as a result of manufacturing (by-products).

During 1985, OHM conducted soil sampling around the vat (ref. 34). A longitudinal sampling grid was constructed underneath the dip vat area. Samples were taken at 5-foot intervals up to a depth of 35 ft. Additionally, soil borings were installed around the Building 737 area. Figures B-1 and B-2 show the sampling locations for the dip vat and Building 737 areas, respectively.

Correspondence with facility personnel by OHM and USAHEA representatives revealed that PCP liquid had been mixed with waste oil in past years and sprayed on the grounds for dust control. Figure B-3 shows six areas suspected of receiving this mixture. The soil samples from each individual area were composited and analyzed. All six areas showed PCP and dioxin contamination. Furthermore, soil exceeding the 200 parts per billion (ppb) cleanup level for total dioxins and furans currently remains below the 10-foot excavation depth for the vat. Table B-10 and Figure 4-26 present the historical data for the site. Also, pesticides have been used extensively in this area. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are PCP, 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), and dioxins. Pesticides are being investigated as part of Site 73, which includes all grassed areas.

The following summary block identifies the major data gaps and DQOs for Site 42.

Site 42—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify the extent of surface soil contamination No data to identify the extent of subsurface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release. Use Level 1 and 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings will be used to evaluate whether contamination is present in the subsurface soils at the site (biased locations). Samples will be collected at depths of 10 ft, 20 ft, 30 ft, and 40 ft. On the basis of field observations (vegetative stress and noticeable staining), five surface soil samples will be collected to assist in delineating the surface soil contamination. Figure 4-26 presents the existing sample data collected during the previous RI investigation; Figure 4-27 presents the proposed sampling locations. The sampling locations were selected based on the location of the dip vat and previous sampling results. The boring depth of 40 ft was selected because there is evidence of dioxins and furans above 200 ppb at the 10-foot excavation depth.

Thirteen samples (two borings, four samples from each boring, and five surface soil samples) will be collected and analyzed for PCP and dioxins using Levels 1 and 2 analytical methods. One sample from a boring and one surface soil sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational samples.

121 113

0 100 200FT

SCALE 1"=100'

KEY MAP

Parameters	(ug/kg)
Toluene	5J
Total PAHs	862.0
4,4'-DDT	51.0
As,Pb,Hg,Ba,Cr,Cu,Ni,Zn	

Parameters	(ug/kg)
Toluene	5J
Total PAHs	867.0
4,4'-DDE	14.0
4,4'-DDT	79.0
∝-Chlordane	33.0
∛-Chlordane	53.0
As,Pb,Ba,Cr,Cu,Ni,Zn	

Parameters(ug/kg)	
2-Butanone	18.0

T702

SS-29

STB-4

SS-47

MW-27

T1-1D

LEGEND

- MW-99 EXISTING MONITORING WELL
- STB-99 SOIL BORING LOCATION
- SS-99 SURFACE SOIL SAMPLE LOCATION
- BENCHMARK
- SCREENING SITE
- NO FURTHER ACTION SITE
- RAILROAD
- SITE AREA

SOURCE: RI REPORT, 1990

FIGURE 4-26
SITES 42, 43, 46, AND 80
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

MSS-0020.DWG 11-Oct-1995

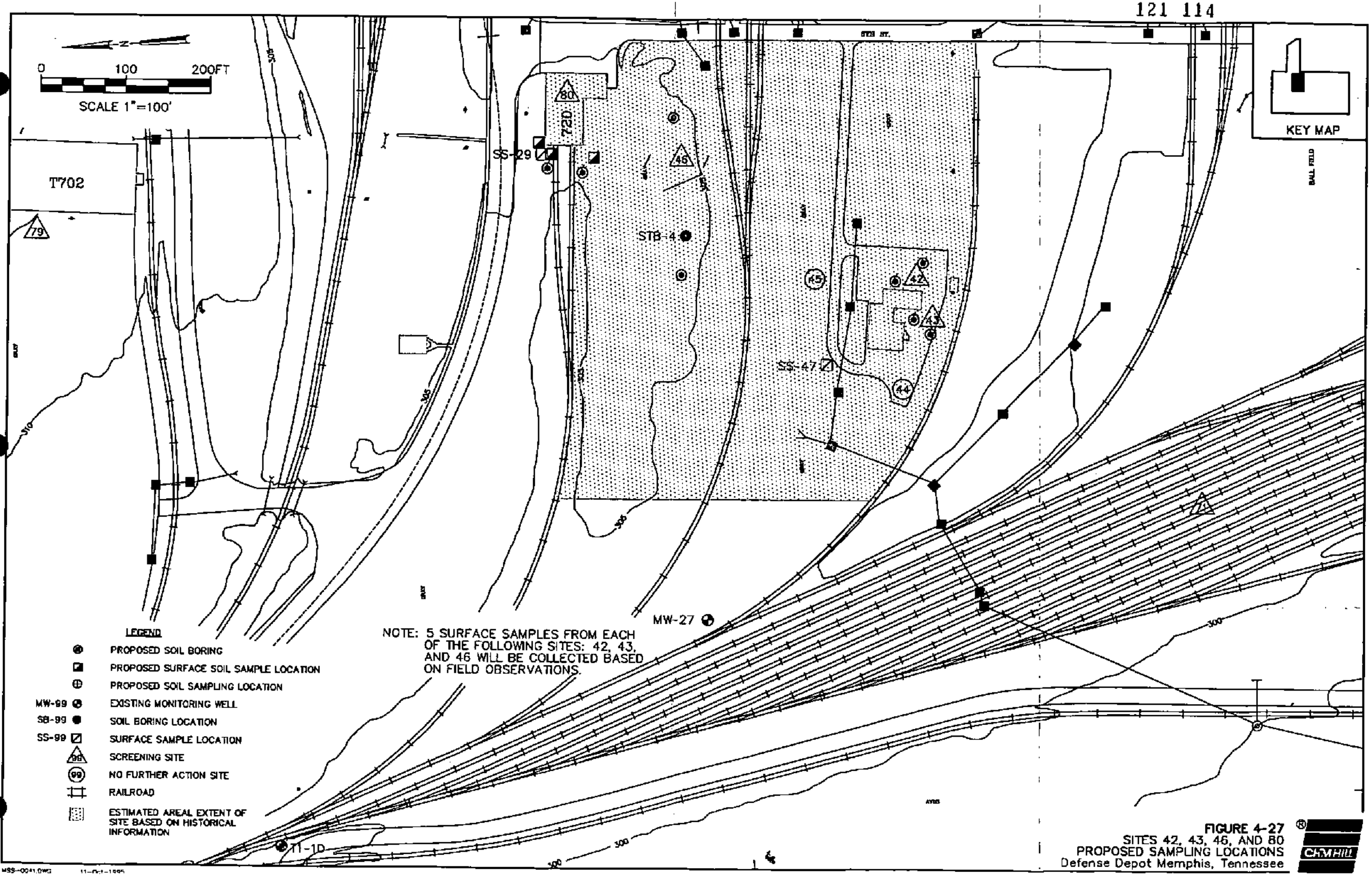


FIGURE 4-27
SITES 42, 43, 46, AND 80
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0041.DWG 11-Oct-1995

4.4.5 Site 43—Former Underground PCP Tank Area

Site 43 contained a UST that stored PCP. PCP, formerly used for treating pallets at the facility, was mixed with waste oil and applied to the ground surface for dust control purposes. Drawing 2 shows that Site 43 is located near the center of the Main Installation, south of Building 737.

During 1985, OHM (ref. 34) conducted the removal of the tank and soil sampling around the excavated tank. The structural integrity of the tank was sound. However, leakage was discovered at six joints between the pump house and tank, and between the pumphouse and dipping vat. The tank was removed, and soils were removed until the excavation pit was approximately 15 ft deep, 20 ft wide, and 22 ft long. Excavation soils that did not exceed 200 ppb total dioxin and furan isomers were used as fill.

The samples that contained more than 200 ppb total dioxins and furans were packed in roll-off containment vessels. Thirty-nine roll-off vessels were stored in the vicinity of former Building 737 and were covered with tarps for weather protection. The roll-offs were subsequently removed from the facility. Figures B-4 and B-5 show the excavated tank area. The excavation was then filled with 650 cubic ft of native soil and 489 tons of crushed stone (Table B-10 and Figure 4-27). Pesticides have been used extensively in this area. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are PCP and dioxins. Pesticides are being investigated facilitywide as part of Site 73, all grassed areas.

The following summary block identifies the major data gaps and DQOs for Site 43.

Site 43—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify the extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify the extent of subsurface soil contamination	Use Level 1 and 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

A biased sampling approach was selected for the site. Therefore, two soil borings will be used to evaluate whether contamination is present. Samples will be collected at depths of 10 ft, 20 ft, 30 ft, and 40 ft. On the basis of field observations (vegetative stress and noticeable staining), five surface soil samples will be collected to assist in delineating the surface soil contamination (Figure 4-27). These sampling locations were selected based

on the former tank location and areas where dioxin and furan contamination was detected at a depth of 15 ft. The boring depth of 40 ft was selected because contamination was detected at depths of 15 ft. The borings should delineate the vertical extent of contamination around the former tank location.

Thirteen samples (two borings, four samples per boring, and five surface soil samples) will be collected and analyzed for PCP and dioxins using Levels 1 and 2 analytical methods. One sample from a boring and one surface soil samples will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational sample.

4.4.6 Site 46–Pallet Drying Area

Site 46 was used to dry pallets after the PCP treating operation (Sites 42 and 43). The site is located near the center of the Main Installation, 115 ft south of Building 720 and 125 ft west of 6th Street (Drawing 2).

One soil boring (STB-4) is located 75 ft west of the site and contained 2-Butanone. Table B-11 and Figure 4-26 present the historical data for the site. On the basis of the sampling data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, PCP, and dioxins.

The following summary block identifies the major data gaps and DQOs for Site 46.

Site 46–Data Gaps and DQOs Defense Depot memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify the extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify the extent of subsurface soil contamination	Use Level 1 and 2 data to expedite the field investigation and the decision process. Use Level 3 data to confirm results of Level 2 data. Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of 10 ft, 20 ft, 30 ft, and 40 ft. On the basis of field observations (vegetative stress and noticeable staining), five surface soil samples will be collected to assist in delineating the surface soil contamination. Figure 4-27 presents the proposed biased sampling locations. The soil sampling locations were selected based on the knowledge of the pallet drying area and the previous soil boring sampling results. The samples will be collected from within the pallet drying area. The 40-foot boring depth was selected because there is knowledge of contamination at 15 ft around the PCP area at DDMT. The borings should describe the vertical extent of contamination from within the area.

Thirteen samples (two borings, four samples per boring, and five surface soil samples) will be collected and analyzed for VOCs, PCP, and dioxins using Levels 1 and 2 analytical methods. One sample from a boring and one surface soil sample will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational samples.

4.4.7 Site 54—Main Installation, DRMO East Storm Water Runoff Canal

Site 54 is a canal that collects the storm water runoff from the Defense Reutilization Marketing Office (DRMO) yard (and associated sites) and other DDMT facilities. Drawing 2 shows the sites associated with Site 54. This site is located near the northeastern part of the Main Installation. The canal is approximately 930 ft long.

No sampling data exist for the site. Therefore, a biased sampling approach will be implemented to evaluate the presence of contamination at the site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, dioxins, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 54.

Site 54—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify any surface soil contamination No data to identify any subsurface soil contamination No data to identify any surface water or sediment contamination	Collect surface soil, subsurface soil, surface water, and sediment samples to evaluate the presence of a contaminant release. Use TCL/TAL data for all samples.

Two soil borings will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. One surface soil sample also will be collected to assist in delineating the surface soil contamination. The sample locations are at the inlet, outlet, and an intermediate point within the canal. These sampling locations were selected so that the data collected will describe the contamination entering, exiting, and migrating to the ditch as storm water runoff. A boring depth of 10 ft was selected because surface and shallow contamination is the probable case.

Seven soil samples (two borings, three samples per boring, and one surface soil sample) will be collected and analyzed for VOCs, SVOCs, pesticides, dioxins, and PPMs. One sample from a boring will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. After a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, three storm water and three sediment samples will be collected from the canal within 48 hours after the rainfall. Level 3 analysis (for PCOCs) will be

conducted on the sediment and water samples. The proposed water and soil sampling locations are presented in Figure 4-25.

4.4.8 Site 55—Main Installation, DRMO North Storm Water Runoff Area

This site collects the storm water runoff from the DRMO yard and the Main Installation. Site 55 is located at the northern end of the Main Installation adjacent to Perimeter Road. The runoff area exiting DDMT is approximately 30 ft wide (Drawing 2).

No sampling data exist for the site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, dioxins, and TAL metals.

The following summary block identifies the major data gaps and DQOs for Site 55.

Site 55—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify the extent of surface soil contamination	Collect surface soil, subsurface soil, surface water, and sediment samples to evaluate the presence of a contaminant release.
No data to identify the extent of subsurface soil contamination	Use TCL/TAL for all samples and decision process.
No data to identify the extent of surface water or sediment contamination	

One soil boring (biased) will be used to assess whether contamination is present at the site (Figure 4-28). Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft.. The sample location was selected at the outlet location to identify contamination exiting DDMT. A boring depth of 10 ft was selected because shallow or surface soil contamination is the probable condition.

Nine soil samples (three borings, three samples per boring) will be collected and analyzed for the TCL/TAL and dioxins. After a rainfall event of at least 0.2 inch after a 72-hour antecedent dry spell, two storm water and two sediment samples will be collected from the canal within 48 hours of the rainfall. Level 3 analysis (for PCOCs) also will be conducted on the sediment and water samples.

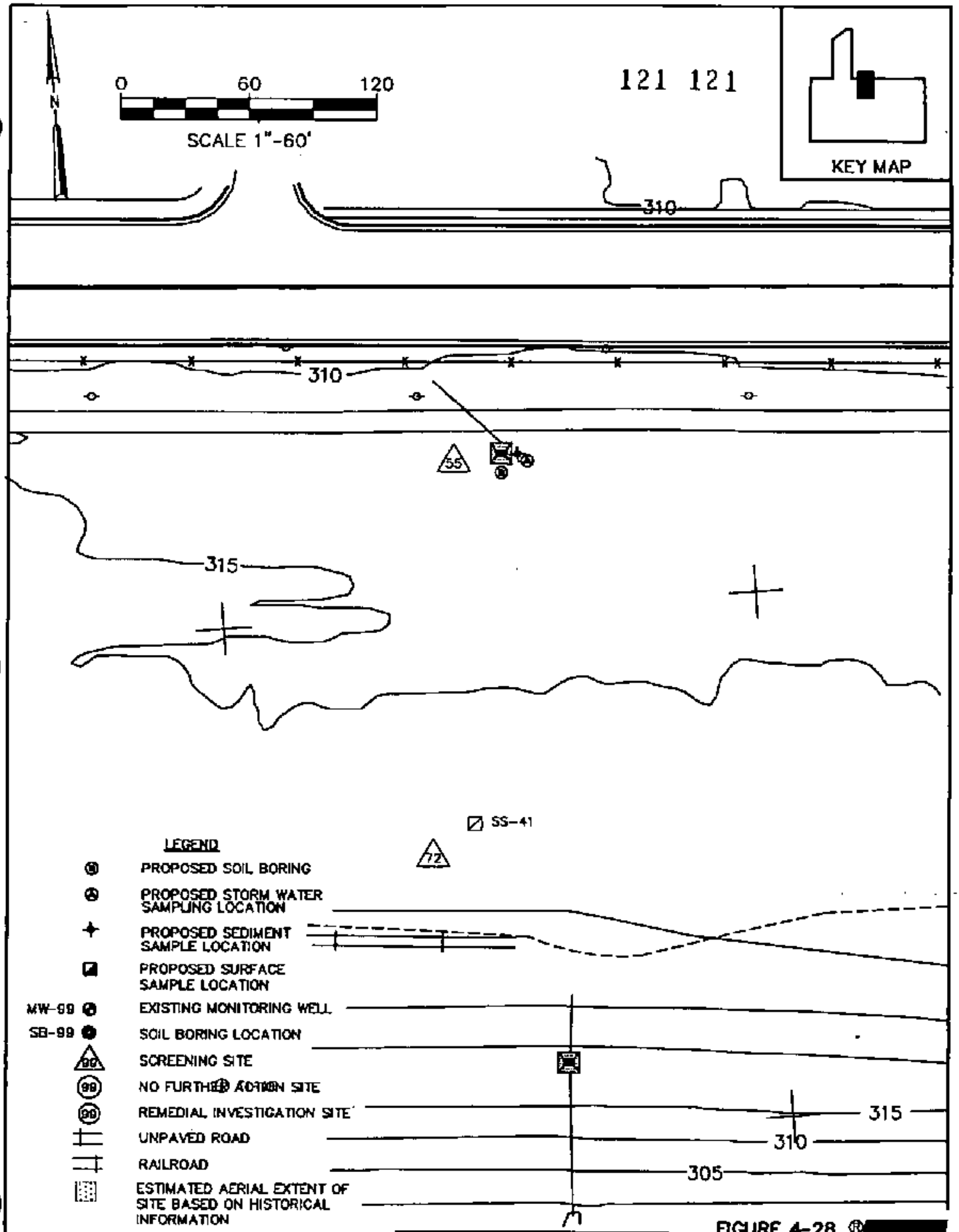


FIGURE 4-28
SITE 55
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0057.DWG 11-Oct-1995

4.4.9 Site 56—Main Installation, West Storm Water Drainage Canal

This site collects the storm water runoff from the PCP tank areas and the western portion of the Main Installation. Drawing 2 illustrates Site 56 on the west side of the Main Installation, adjacent to Perry Road and north of Gate 9.

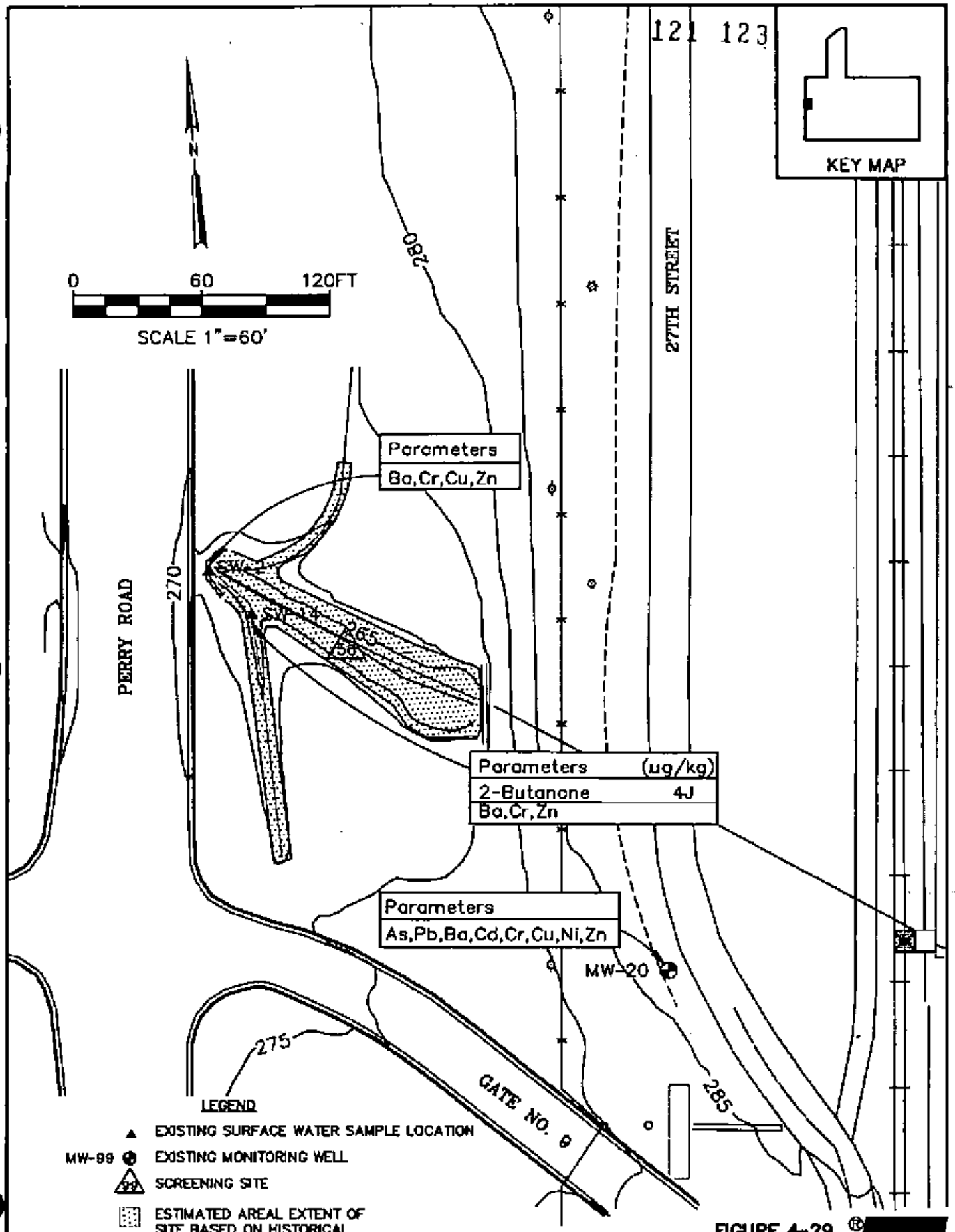
Two surface water samples (SW-2 and SW-14) taken during the *RI Report* (ref. 4) indicated the presence of 2-Butanone and metals. Table B-6 and Figure 4-29 present the historical data for the site. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, dioxins, and TAL metals.

The following summary block identifies the major data gaps and DQOs for Site 56.

Site 56—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify any surface soil contamination No data to identify any subsurface soil contamination No data to identify any surface water or sediment contamination	Collect surface soil, subsurface soil, surface water, and sediment samples to evaluate the presence of a contaminant release. Use TCL/TAL data for all samples at the site.

One soil boring will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Three surface soil samples also will be collected to assist in evaluating the presence of surface soil contamination. The biased soil samples are located at each stream where the stream enters the existing pathway. This sampling strategy may reveal information regarding the source of contaminants entering the drainageway and the amount of contamination exiting the facility.

Six soil samples (one boring, three samples for the boring, and three surface soil samples) will be collected and analyzed for VOCs, SVOCs, pesticides, dioxins, and TAL metals using Level 2 analytical protocols. Ten percent will be analyzed using Level 3 analytical protocol. After a rainfall event of at least 0.2 inch and after a 72-hour antecedent dry spell, three storm water samples and three sediment samples will be collected within 48 hours after the rainfall. The sediment and water samples will be analyzed for PCOCs using Level 3 analytical methods. Figure 4-29 presents the existing sample data, and Figure 4-30 presents the proposed sampling locations.



SOURCE: RI REPORT, 1990

FIGURE 4-29
SITE 56
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

MSS-0031.DWG 11-Oct-1995

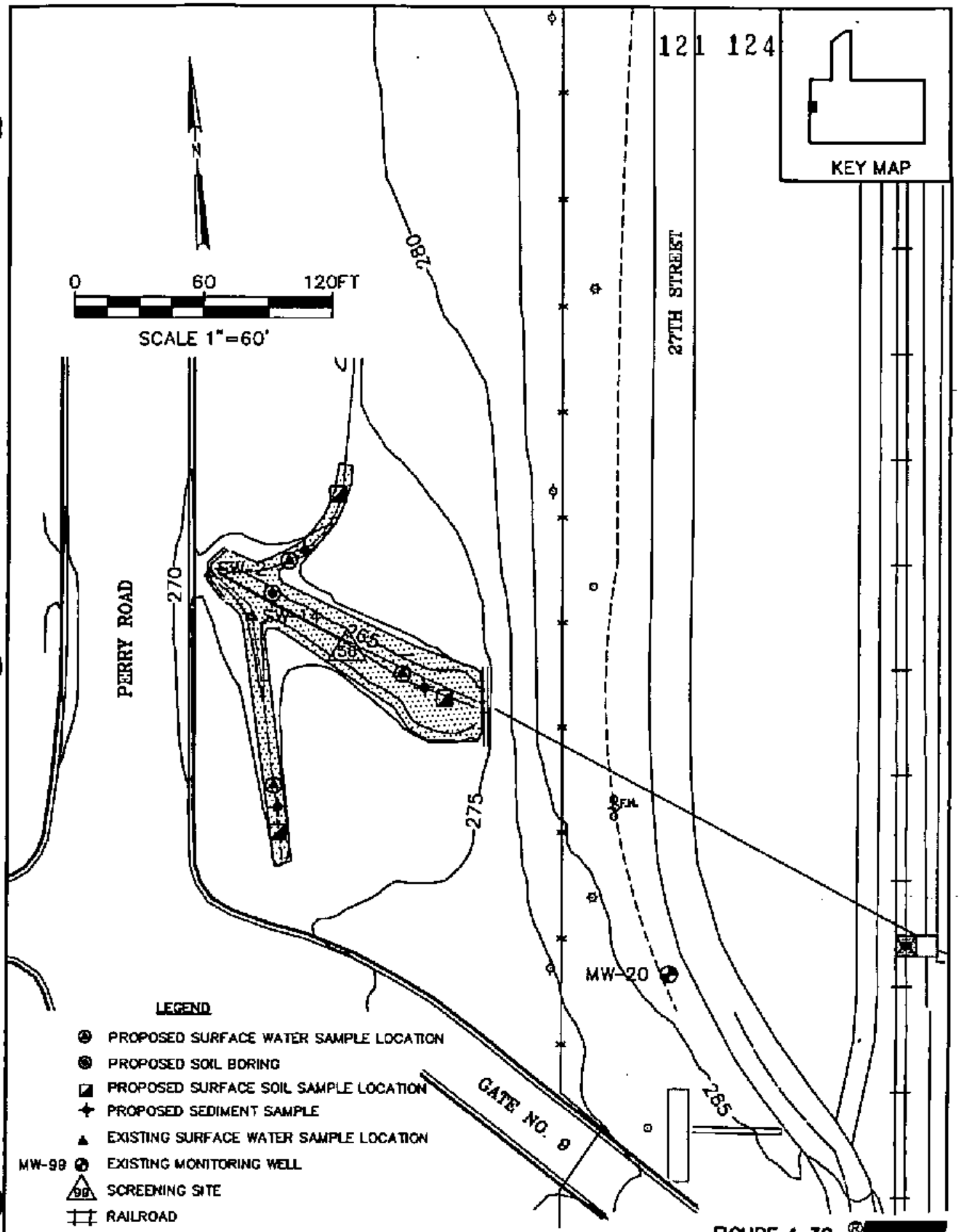


FIGURE 4-30
SITE 56
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0038.DWG 11-Oct-1995

4.4.10 Site 70—POL, Various Chemicals (RR track 1, 2, 3, 4, 5, and 6) Leaks

This site consists of all potential railcar spills throughout DDMT. No previous sampling data exist for Site 70. Also, waste oil (mixed with PCP) has historically been used at the facility for weed control around railroad tracks (see Site 71 description). On the basis of spills possibly occurring at this site and the known potential for contamination at the facility, the PCOCs are the TCL/TAL.

The following summary block identifies the major data gaps and DQOs for Site 70.

Site 70—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify if a release has occurred to surface soils	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify if a release has occurred to subsurface soils	Use field screening data to analyze all samples.

Seventy surface soil samples will be collected along the railroad tracks at DDMT. Samples will be collected in native soil beneath materials used for railbed construction. Thirty of the surface soil sample locations will be field selected on the basis of visual inspection. Twenty of the surface soil samples will be collected at high potential areas where loading and unloading of materials occur, at track switch areas, and at areas where historical spills have occurred. The remaining 20 samples will be collected in areas where waste oil was probably not applied. The samples will be analyzed for PAHs and PCP using Level 1 analytical and reporting methods.

Shallow soil borings (approximately 10 ft deep) will be installed at selected locations where surface samples indicate the presence of contamination. Samples indicating the presence of contaminants (using Level 1 data) will be analyzed for the TCL/TAL. The observational approach will be used to assess the further need for samples. Additional samples will be collected as needed to describe the horizontal and vertical extent of previously detected contamination.

4.4.11 Site 71—Herbicide (all RR tracks) (used to clear tracks)

Pesticides and herbicides have been applied to the railroad tracks throughout DDMT for weed and pest control purposes. Historically, weed control also has been conducted through the use of a waste oil and PCP mix (1970s). Pesticides and herbicides are being investigated facilitywide as part of Site 73.

No previous sampling data exist for this site. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are pesticides, SVOCs, and dioxins.

This site is concurrently being investigated with Site 70. All samples collected for Site 70 will be used to evaluate the status of Site 71 as well.

4.4.12 Site 72—Waste Oil (PDO Yard) Surface Application for Dust Control

Waste oils mixed with PCP were applied to the soil surface in the PDO Yard for dust and weed control purposes. Site 72, located in the northern section of the Main Installation, is north of B Street (Drawing 2).

One surface soil sample (SS-41) located at the center of the site indicated the presence of toluene, PAHs, pesticides, and metals (Figure 4-31). Table B-9 presents the historical data for the site. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are PAHs, PCP, and metals. Pesticides are being investigated facilitywide as Site 73, all grassed areas.

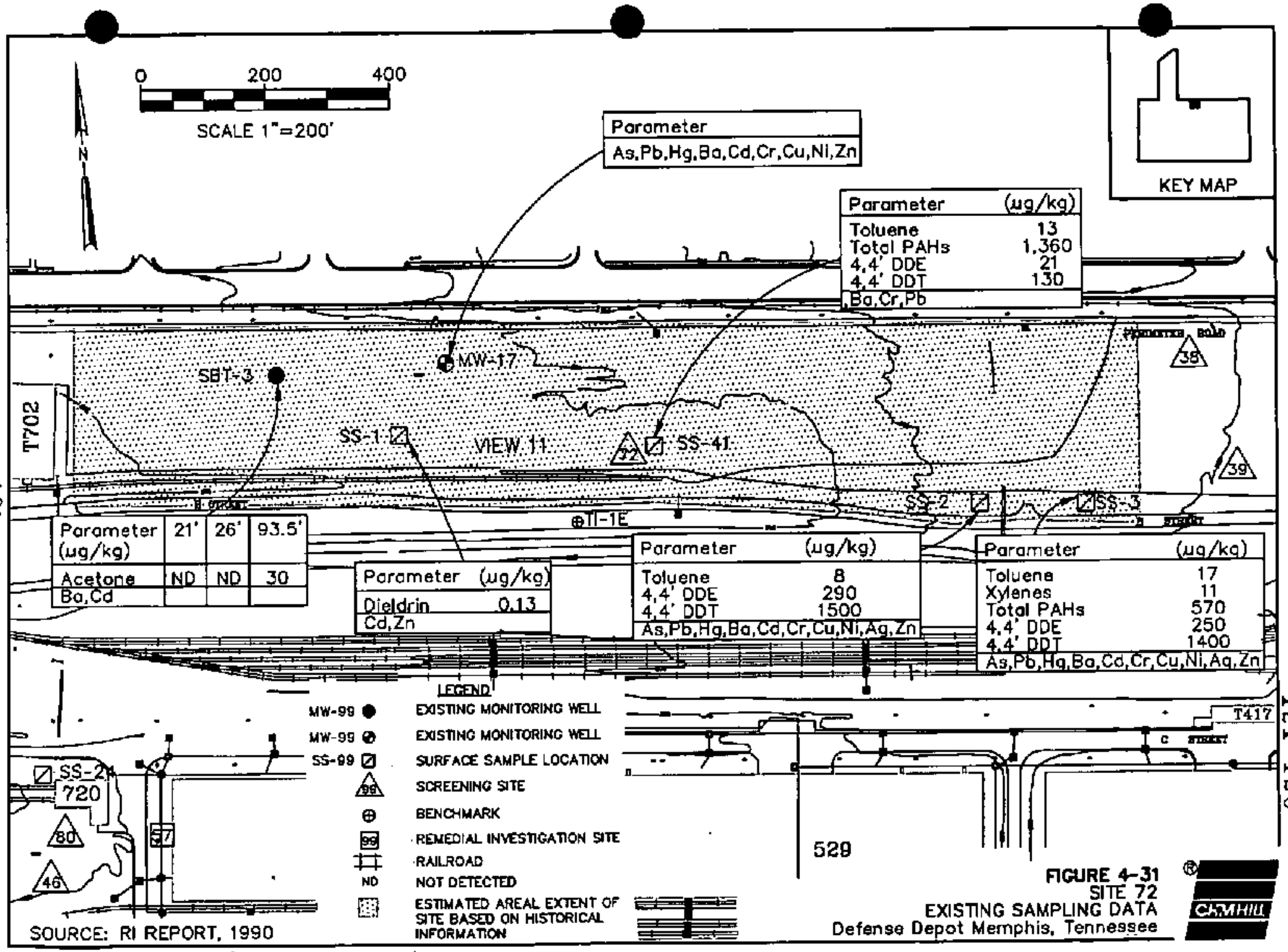
The following summary block identifies the major data gaps and DQOs for Site 72.

Site 72—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify the extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify the extent of subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

A systematic sampling approach was selected for the site to create a statistical database for comparison to regulatory limits (ARARs and PRGs). Nine surface soil samples will be collected to assist in describing the surface soil contamination. Figure 4-32 shows the location of the systematic sample locations. Surface samples were selected because the waste oil was applied directly to the surface soils; therefore, surface soil contamination is the probable condition.

The nine surface soil samples will be collected and analyzed for PAHs, PCP, and metals using Level 2 analytical methods. One sample from a surface soil sampling location will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination.



SOURCE: RI REPORT, 1990

FIGURE 4-31
SITE 72
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

CH2MHILL

MSS-0017.DWG 11-Oct-1995

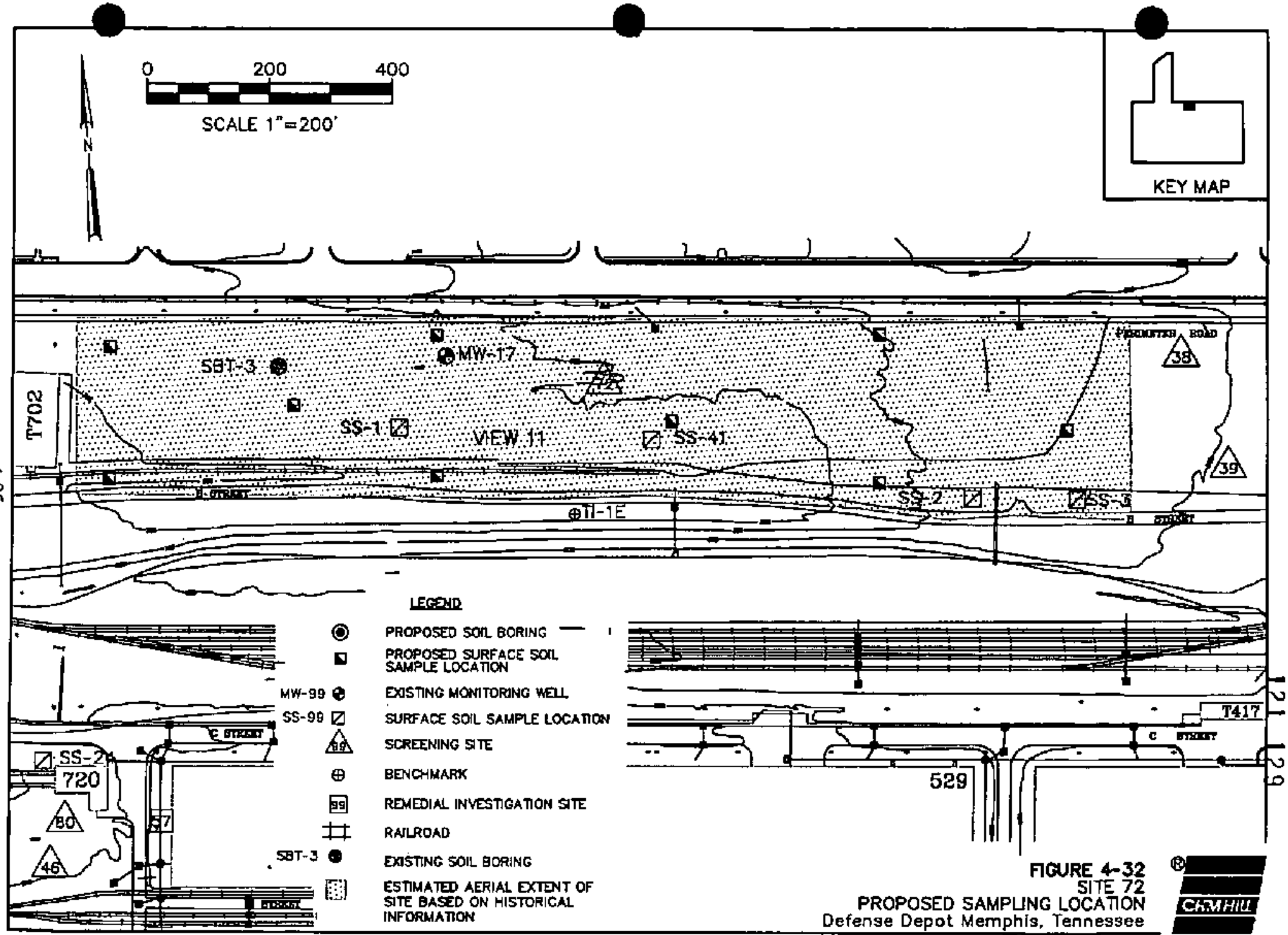


FIGURE 4-32
SITE 72
PROPOSED SAMPLING LOCATION
Defense Depot Memphis, Tennessee

CH2MHILL

MSS-0051.DWG 11-Oct-1995

4.4.13 Site 74—Flammables, Toxics (West End Building 319)

Drawing 2 shows this site on the west end of Building 319, off of C street. Site 74 historically has been used for the storage of flammable and toxic materials.

No sampling data exist for this site. Therefore, a biased sampling approach will be implemented to evaluate the presence of contamination. On the basis of flammable and toxic materials previously stored at this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 74.

Site 74—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify extent of subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings at biased locations will used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Figure 4-33 presents the site location and the proposed sampling locations. These sampling locations were selected based on activities conducted at the storage area such as loading and unloading areas and surface water drainage pathways. Twenty-foot soil borings were selected because shallow and surface soil contamination is the probable condition.

Twelve samples (three borings, four samples each boring) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. One sample from each boring will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational sample.

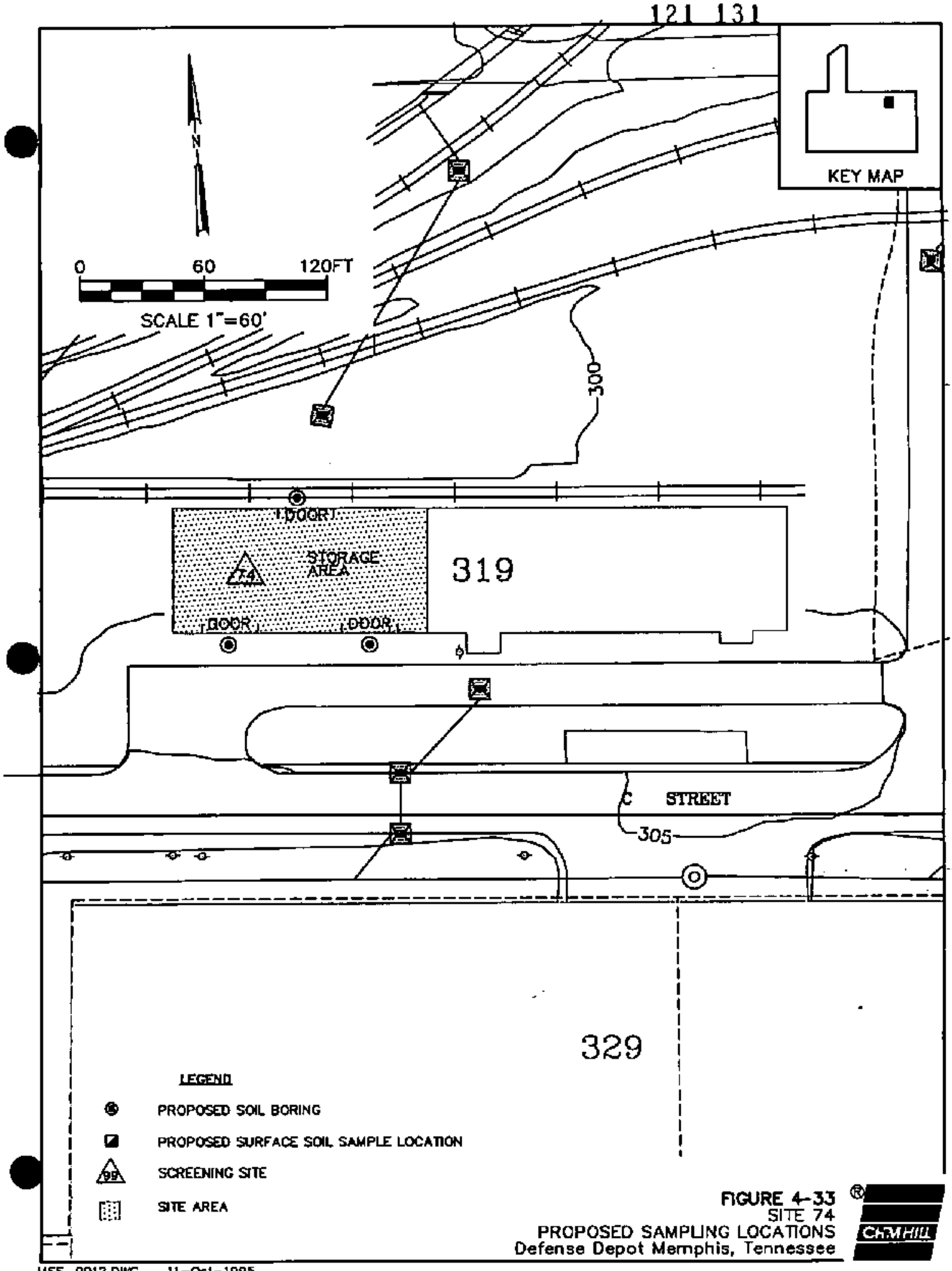


FIGURE 4-33
SITE 74
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0012.DWG 11-Oct-1995

4.4.14 Site 79—Fuels, Miscellaneous, Liquid, Wood, and Paper

Site 79 (Drawing 2) is located adjacent to Building 702, approximately 2,400 ft from the western boundary and 200 ft from the northern boundary of the Main Installation. No additional information about this site exists.

No sampling data exist for this site. On the basis of the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, pesticides, and PPMs.

The following summary block identifies the major data gaps and DQOs for Site 79.

Site 79—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify extent of subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Three soil borings (biased) will be used to evaluate whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Three additional surface soil samples also will be collected to assist in delineating the surface soil contamination (Figure 4-34). The sample locations were selected based on activities conducted at the building such as waste loading, unloading, and storage areas. A 20-foot boring depth was selected based on shallow and surface soil contamination being the probable condition because of surface spills.

Fifteen samples (three borings, four samples per boring, and thee surface soil samples) will be collected and analyzed for VOCs, SVOCs, pesticides, and PPMs using Level 2 analytical methods. One sample from two borings will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest relative amount of contamination. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational samples.

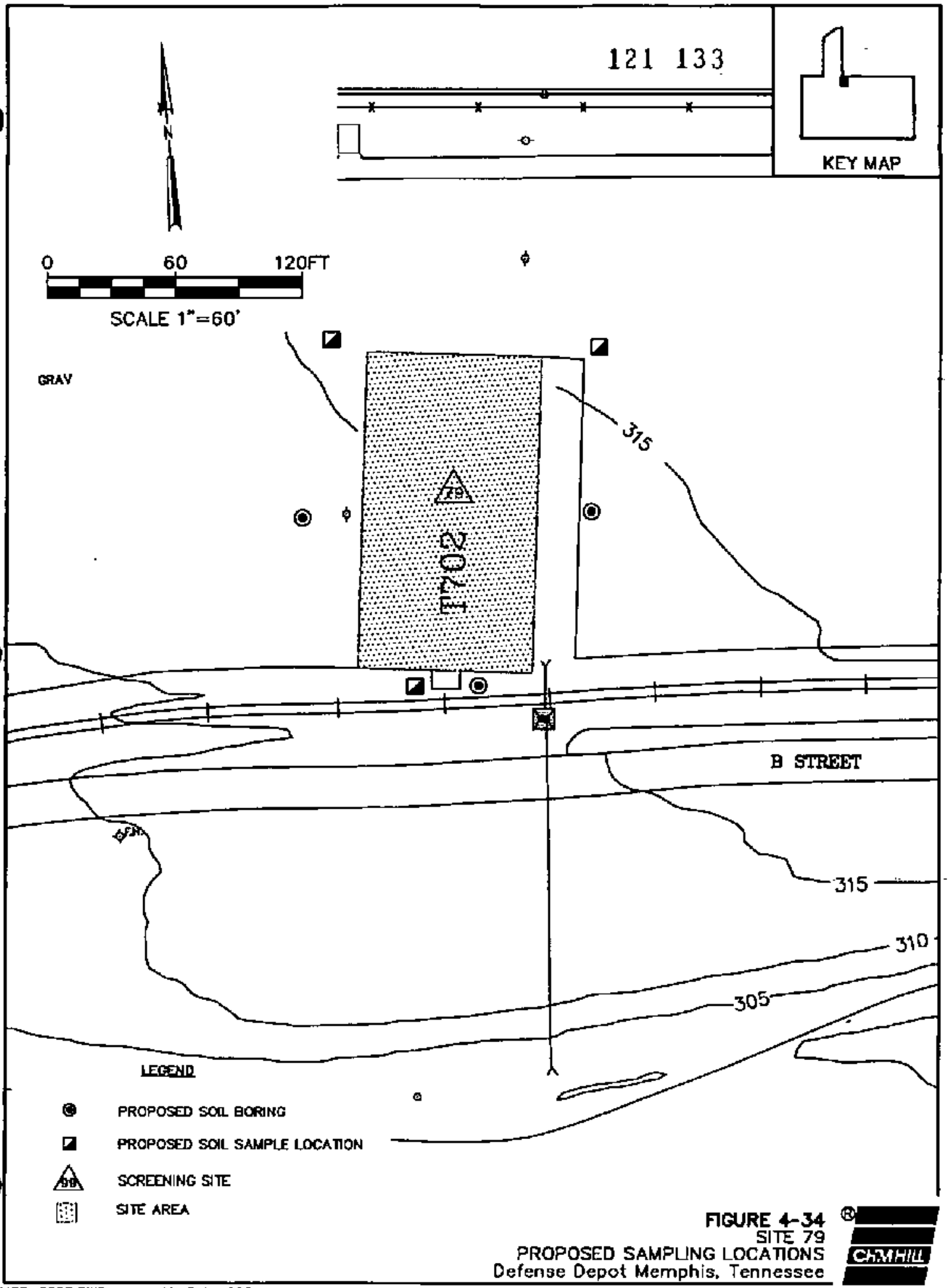


FIGURE 4-34
SITE 79
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0009.DWG 11-Oct-1995

4.4.15 Site 80—Fuel and Cleaners Dispensing, Building 720

Building 720 contains one 12,000-gallon, aboveground diesel fuel storage tank. This tank is scheduled for replacement. Cleaners are also stored in Building 720 and dispensed. Site 80 is located approximately 2,000 ft east of the western boundary and 700 ft south of the northern boundary of the Main Installation (Drawing 2).

One surface soil sample (SS-29) taken adjacent to Building 720 during the *RI Report* (ref. 4) indicated the presence of VOCs, PAHs, dichlorodiphenyltrichloroethane (DDT), and metals (Table B-12 and Figure 4-26). On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, PAHs, and metals. Pesticides are being investigated facilitywide as part of Site 73, all grassed areas.

The following summary block identifies the major data gaps and DQOs for Site 80.

Site 80—Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to identify extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify extent of subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field selected location.

Two soil borings will be used to assess whether contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Three surface soil samples also will be collected to assist in delineating the surface soil contamination. The biased proposed sampling locations are presented in Figure 4-27. These sample locations were selected based on the location of the storage tank and the loading and unloading area around the railroad tracks that enter the building on the south side. Because the tank is above ground and surface spills are the probable condition, boring depths of 20 ft were selected.

Eleven samples will be collected and analyzed for VOCs, PAHs, and metals. One sample from each boring will be sent to an FBL for confirmational analysis (two samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest amount of relative concentration. Level 3 analysis (for PCOCs) will be conducted on the remaining confirmational sample.

4.4.16 Site 81—Fuel Oil Building 765

Building 765 contains an aboveground fuel oil storage tank. This tank will be removed under a separate action by DDMT.

Drawing 2 shows Site 81 as being approximately 2,200 ft east of the western boundary and 1,350 ft south of the northern boundary of the installation.

No sampling data exist for this site. Therefore, a biased sampling strategy will be implemented to evaluate the presence of contamination. On the basis of the site description and the known potential for contamination at the facility, the PCOCs are SVOCs and PAHs.

The following summary block identifies the major data gaps and DQOs for Site 81.

Site 81—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

One soil boring will be installed at the site. Boring samples will be tentatively collected at depths of zero to 12 inches, 5 ft, 10 ft, and 20 ft. Three surface soil samples will be collected at biased locations to evaluate the extent of potential surface soil contamination. Figure 4-35 presents the proposed sampling locations. These sampling locations were selected based on the location of the tank. These locations may detect potential contamination that could be a result of spillage from the tank. The soil boring will be terminated at a depth where a field flame ionization detector no longer detects contamination and is estimated at 20 ft. This strategy is consistent with the observational approach.

Eight samples (one boring, five samples, and three surface soil samples) will be analyzed for SVOCs and PAHs. One surface soil sample will be sent to an FBL for confirmational analysis. On the basis of field screening results, a TCL/TAL will be run on the sample with the highest amount of relative contamination.

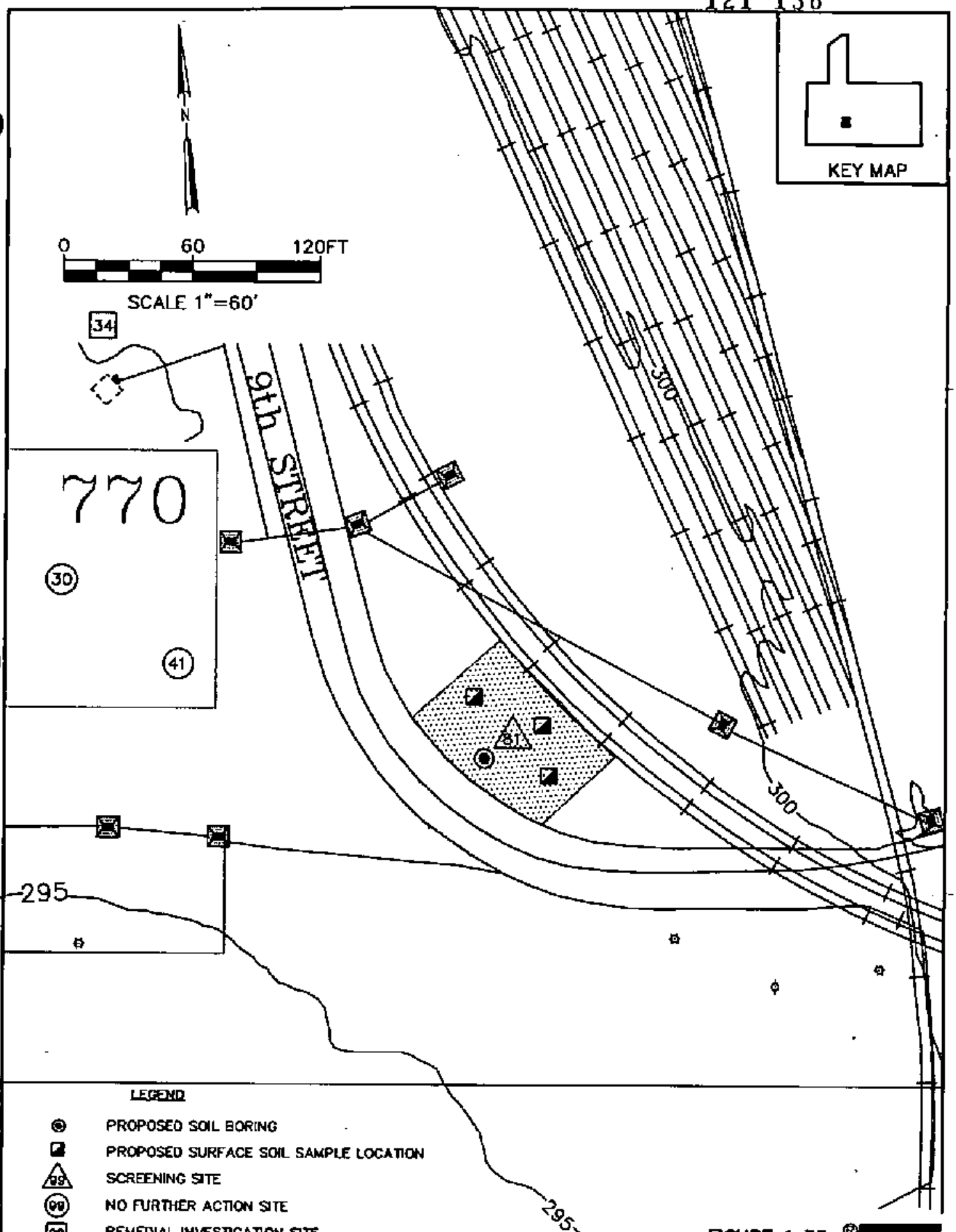


FIGURE 4-35
SITE 81
PROPOSED SAMPLING LOCATIONS
Defense Depot Memphis, Tennessee

M5S-0018.DWG 11-Oct-1995

4.4.17 Site 83—Dried Paint Disposal Area

This location was apparently used to dispose of dried paint residues. Site 83 is adjacent to the south side of Building 949 (Drawing 2).

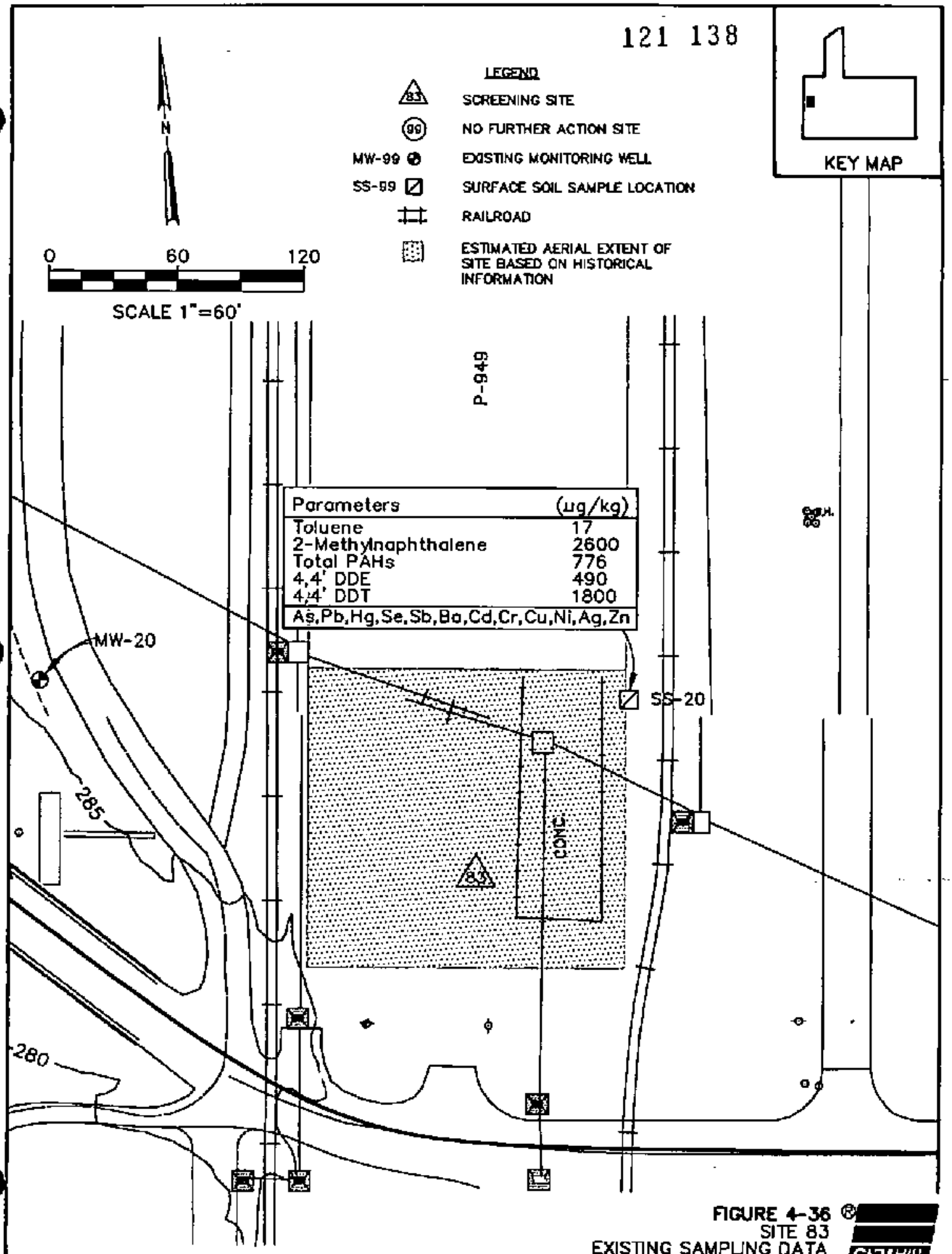
One sample was previously collected adjacent to the site. This surface soil sample (SS-20) detected metals, pesticides, VOCs, and SVOCs. Data are shown in Figure 4-36 and in Table B-8. On the basis of the data provided for this site and the known potential for contamination at the facility, the PCOCs are VOCs, SVOCs, and metals. Pesticides are being investigated facilitywide as part of Site 73, all grassed areas.

The following summary block identifies the major data gaps and DQOs for Site 83.

Site 83—Data Gaps and DQOs Defense Depot Memphis, Tennessee	
Data Gaps	**DQOs**
No data to identify extent of surface soil contamination	Collect surface and subsurface soil samples to evaluate the presence of a contaminant release.
No data to identify subsurface soil contamination	Use Level 2 data to expedite the field investigation and the decision process.
	Use Level 3 data to confirm results of Level 2 data.
	Collect a minimum of one TCL/TAL sample at a field-selected location.

Two soil borings will be used to evaluate whether subsurface soil contamination is present at the site. Samples will be collected at depths of zero to 12 inches, 5 ft, and 10 ft. Four additional surface soil samples will be collected to assist in possibly determining the extent of surface soil contamination (biased locations). Figure 4-37 presents the proposed sampling locations. These sampling locations were selected based on the areas where the wastes were disposed and on previous sampling results. A boring depth of 10 ft was selected due to the site being a surface disposal area and surface and shallow soil contamination being the probable condition.

Ten samples (two borings, three samples per boring, and four surface soil samples) will be collected and analyzed for VOCs, SVOCs, and PPMs using Level 2 analytical methods. One sample from a boring will be sent to an FBL for confirmational analysis (three samples). On the basis of field screening results, a TCL/TAL will be run on the sample with the highest amount of relative contamination.



SOURCE: RI REPORT, 1990

FIGURE 4-36
SITE 83
EXISTING SAMPLING DATA
Defense Depot Memphis, Tennessee

MSS-0054.DWG 11-Oct-1995

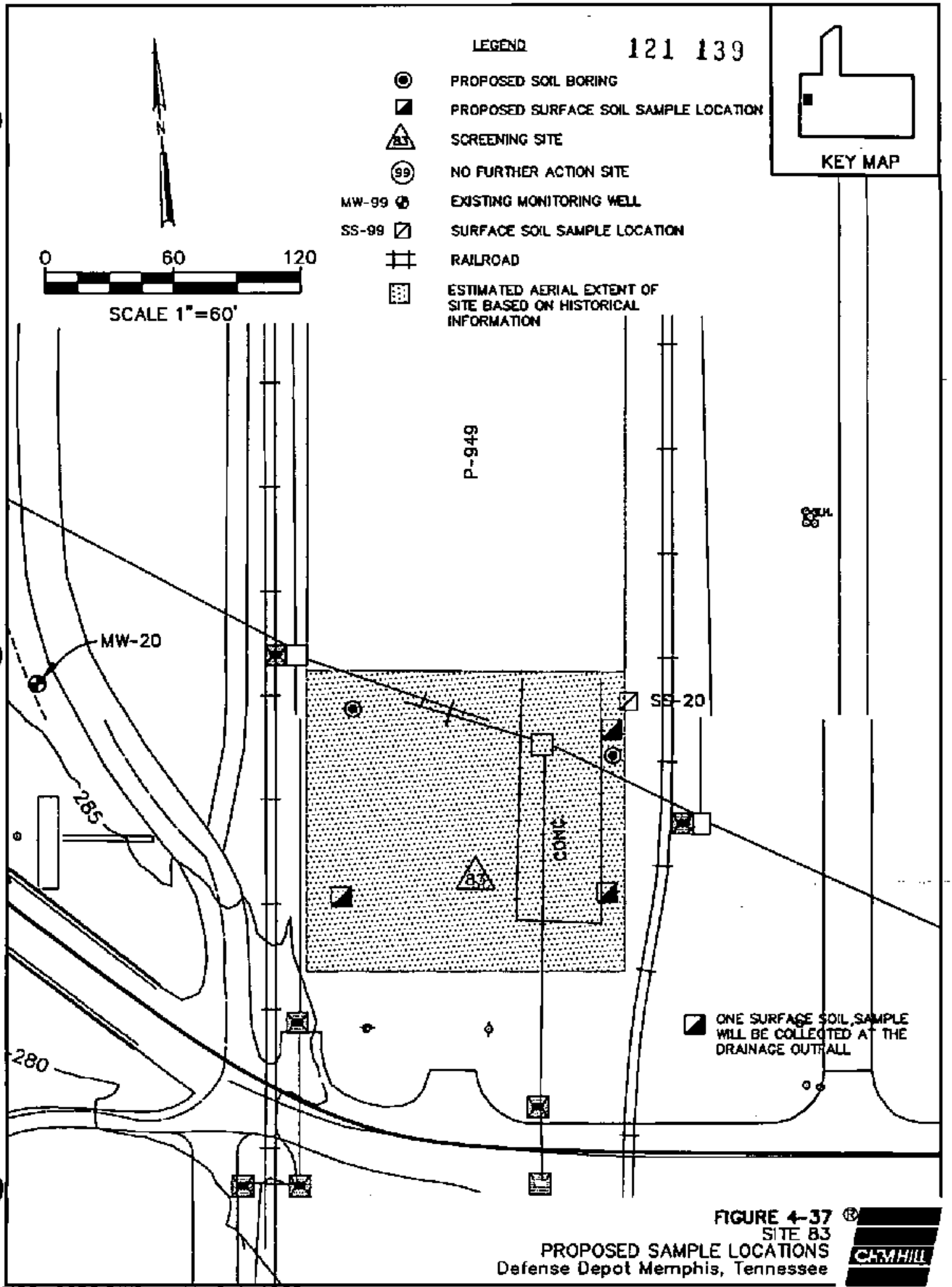


FIGURE 4-37
SITE 83
PROPOSED SAMPLE LOCATIONS
Defense Depot Memphis, Tennessee

MSS-0055.DWG 11-Oct-1995

4.4.18 Offsite Drainage Pathways

There are approximately 10 locations (point sources) where storm water exits the facility and travels through residential or industrial areas. Two locations are present where storm water flows onto the facility. Samples will be collected at these locations to assess the presence of contaminants in sediment and storm water from operations at DDMT and from offsite sources that contribute storm water runon to DDMT.

Because of the wide variety of sites at the facility, the PCOCs for the drainage pathways are the TCL/TAL.

The following summary block identifies the major data gaps for the offsite drainage pathways.

Offsite Drainage Pathways–Data Gaps and DQOs
Defense Depot Memphis, Tennessee

Data Gaps	DQOs
No data to assess past disposal/runoff contamination No data to assess current runoff contamination	Collect one TCL/TAL sample of the sediments immediately offsite. Collect one TCL/TAL sample of the current storm water runoff. Use Level 3 data quality.

One sediment/surface water pair was selected at biased locations to initially screen nine of the drainage pathways (runon and runoff). The sample will be collected immediately offsite to evaluate both current and potential historical releases from the facility. Additionally, 18 sediment samples will be collected for TCL/TAL analyses in the Rozelle Street area. Three storm water samples will be collected in the Rozelle Street area (one from each storm drainage pathway).

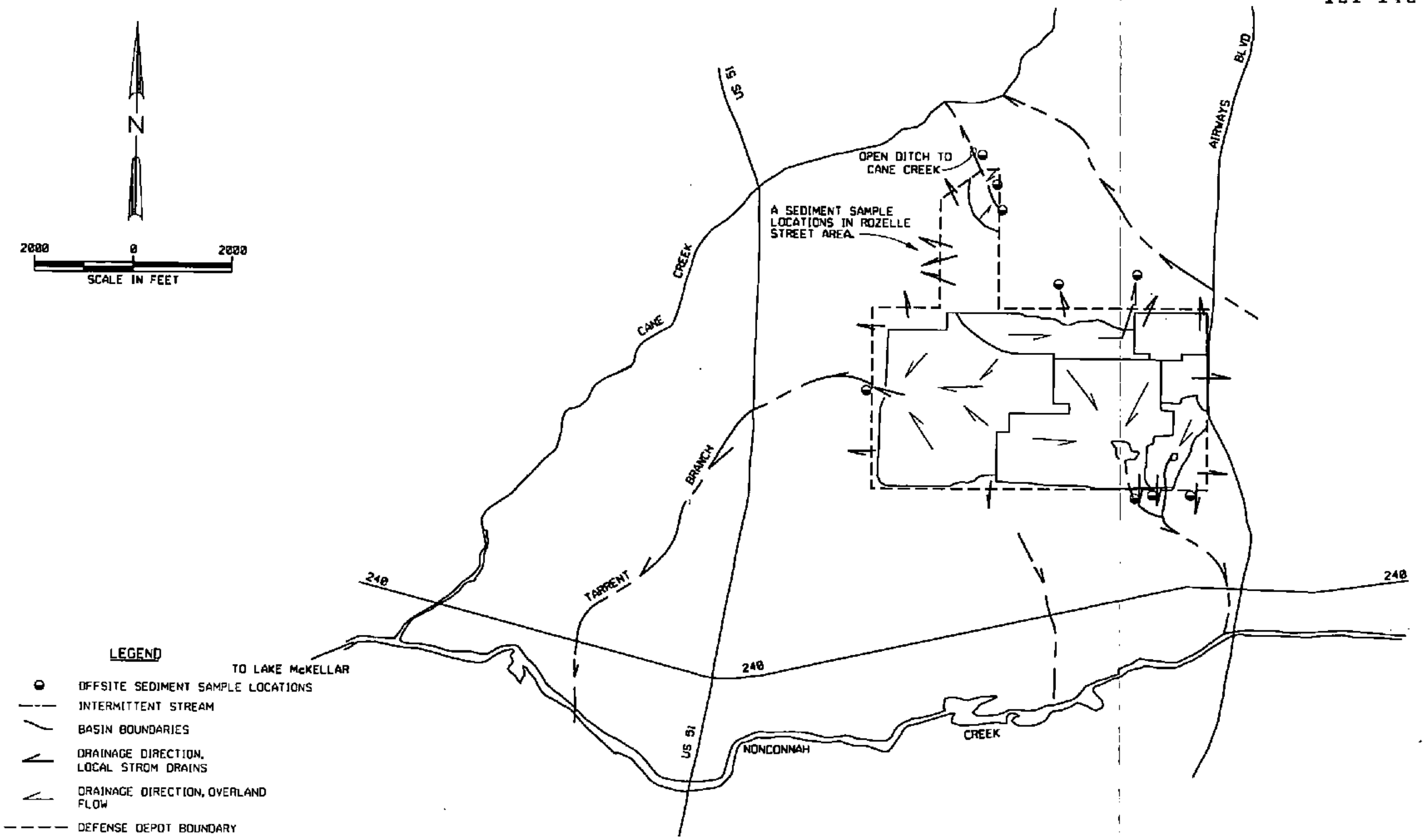
A total of 27 sediment and 12 storm water samples will be collected in drainage pathways at the facility. These locations, illustrated in Figure 4-38, were field selected with EPA and TDEC. The locations are as follows:

- Lake Danielson outlet ditch (one pair)
- Golf Course pond outlet ditch (one pair)
- Drainage at Perry and Ellison (beneath concrete liner) (one pair)
- Drainage at the northeastern corner of the facility (one pair)

- Drainage at the southern end of the facility at the intersection of Ball and Mullen (one pair)
- Drainage at the north end of Dunn Field (one pair)
- Drainage (two locations) at the northeastern corner of Dunn Field (flows onto facility) (two pairs)
- Outfall of drainage that leads from the northern portion of the Main Installation (one pair)
- Three ditches that flow westerly from Dunn Field into the Rozelle Street area (18 sediment and 3 surface water samples)

Where required, samples for sediment will be collected beneath concrete liners or other structures and recent improvements to screen sediments that have been historically deposited.

All samples will be collected in accordance with Section 5.3 of the *QAPP* (ref. 31).



SOURCE: MODIFIED FROM DDMT, 1982. DRAFT SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN.
MODIFIED FROM HARLAND, BARTHOLOMEW & ASSOCIATES, INC., 1988. MASTER PLAN REPORT, DDMT.
MODIFIED FROM DDMT, 1992. NPDES STORM DRAINAGE SAMPLING MAP, DRAWING NUMBER 45-90.

NOTE: SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS WERE FIELD SELECTED BY DDMT, EPA, AND TDEC. DETAIL MAPS REGARDING LOCATIONS AND RECORDED IN THE JULY, 1995 MEETING MINUTES.

FIGURE 4-38
DRAINAGE PATHWAY SAMPLES

Table 4-1
Proposed Number of Analyses for Level 1 and 2 Data Quality
Defense Depot Memphis, Tennessee

		Level 1 (1) Analytical Methods			Level 2 Analytical Methods												
OU	Site	Total PAHs	PCP	Dioxin	VOCs	SVOCs	Metals PPM (2)	TAL (3)	Zn (4)	2,3,7,8 - TCDD (5)	Pesticides (6)	PCBs	PAHs	F (7)	Br (8)	pH	TOTALS
1	19	-	-	8	-	8	8	-	-	-	-	-	-	-	8	-	32
1	20	-	-	-	9	-	9	-	-	-	-	-	9	-	-	-	27
1	21	-	-	-	-	12	-	-	12	-	-	-	-	-	-	-	24
4	28	-	-	-	11	11	11	-	-	-	11	-	-	-	-	-	44
2	31	-	-	-	14	-	14	-	-	-	-	14	14	-	-	-	56
2	33	-	-	-	21	-	21	-	-	-	-	21	-	-	-	-	63
4	35	-	-	-	12	12	12	-	-	-	12	-	-	-	-	-	48
4	36																0
4	37				56	56	56				56						224
4	38																0
4	39																0
4	42	-	13	-	-	-	-	-	-	13	-	-	-	-	-	-	26
4	43	-	13	-	-	-	-	-	-	13	-	-	-	-	-	-	26
4	46	-	13	-	13	-	-	-	-	13	-	-	-	-	-	-	39
1	50	-	-	10	10	10	10	-	-	-	10	-	-	-	-	-	50
3	51	-	-	-	15	15	15	-	-	-	15	-	-	-	-	-	60
3	52	-	-	-	-	-	13	-	-	-	13	-	13	-	-	-	39
4	54	-	-	-	7	7	7	-	-	7	7	-	-	-	-	-	35
4	55	-	-	-	9	9	-	9	-	-	9	9	-	-	-	-	45
4	56	-	-	-	6	6	-	6	-	6	6	-	-	-	-	-	30
1	61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
1	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
3	65	-	-	-	-	14	-	-	14	-	-	-	-	-	-	-	28
3	66	18	-	-	17	17	-	-	-	-	-	-	-	-	-	-	52
3	67	12	-	-	12	-	12	-	-	-	-	-	-	-	-	-	36
3	68	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	4
3	69	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	10
4	70/71	70	70	-	-	-	-	-	-	-	-	-	-	-	-	-	140
4	72	-	9	-	-	-	9	-	-	-	-	-	9	-	-	-	27
3	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
4	74	-	-	-	12	12	12	-	-	-	12	-	-	-	-	-	48
3	75	-	-	-	10	10	-	-	-	-	-	-	-	-	-	-	20
3	76	-	-	-	9	9	9	-	-	-	9	-	-	-	-	-	36
3	77	-	-	-	12	12	12	-	-	-	12	-	-	-	-	12	60
3	78	-	-	-	12	12	12	-	-	-	-	-	-	12	-	12	60
4	79	-	-	-	15	15	15	-	-	-	15	-	-	-	-	-	60
4	80	-	-	-	11	-	11	-	-	-	-	-	11	-	-	-	33
4	81	-	-	-	-	8	-	-	-	-	-	-	8	-	-	-	16
2	82	-	-	-	20	20	20	-	-	-	20	-	-	-	-	-	60
4	83	-	-	-	10	10	10	-	-	-	-	-	-	-	-	-	30
2	84	-	-	-	22	22	22	-	-	-	22	-	-	-	-	-	88
2	89	-	-	-	18	-	18	-	-	-	-	-	-	-	-	18	54
Drainage		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL		100	118	18	383	307	338	15	26	52	229	44	78	12	8	42	1750

- Not Analyzed
(1) Level 1 data to be analyzed using immunoassays
(2) PPM - Priority Pollutant Metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn)
(3) Target Analyte List (Metals - 23)
(4) Zn - Zinc
(5) 2,3,7,8-TCDD - 2,3,7,8-Tetrachlorodibenzo-p-dioxin
(6) Pesticides refer to 8080 and 8150 (herbicides) analytical parameters
(7) Fl - Flouride
(8) Br - Bromide

Note: The Generic QAPP contains all of the analytical methods that will be used during the RI/FS at DDMT

mgm85-DDMT-WP4/060.wk1

Table 4-2
Proposed Number of Analyses for Level 3 Data Quality
Defense Depot Memphis, Tennessee

		Level 3 Soils																Level 3 Water										
OU	Site	VOCs	SVOCs	Metals PPM (1)	Al (2)	Zn (3)	2,3,7,8 - TCDD (4)	Pesticides (5)	PCBs	Dioxins	PCP	PAHs	Thiodyglycol	TCL/TAL (5)	F (7)	pH	Br (8)	VOCs	SVOCs	Total Metals PPM (1)	Soluble Metals PPM (1)	Pesticides (5)	Dioxins	PAHs	Thiodyglycol	Al	TCL/TAL	Totals
1	19*	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	3
1	20	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1	21	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
4	26	1	1	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
2	31	1	-	1	-	-	-	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
2	33	2	-	2	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	7
4	35	1	1	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6
4	36																											0
4	37	4	4	4				4						2														18
4	38																											0
4	39																											0
4	42	-	-	-	-	-	1	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	4
4	43	-	-	-	-	-	1	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
4	46	1	-	-	-	-	1	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
1	60	-	-	-	-	-	-	-	-	10	-	-	-	1	-	-	-	1	1	1	1	1	1	-	-	-	-	17
3	61	1	1	1	-	-	-	1	-	-	-	-	-	1	-	-	-	3	3	3	3	3	-	-	-	-	-	20
3	62	-	-	1	-	-	-	1	-	-	-	1	-	1	-	-	-	-	-	2	2	2	-	2	-	-	-	12
4	54	3	3	3	-	-	-	3	-	4	-	-	-	1	-	-	-	3	3	3	3	3	3	-	-	-	-	35
4	55	-	-	-	-	-	-	-	-	4	-	-	-	4	-	-	-	-	-	-	-	-	3	-	-	-	3	14
4	56	3	3	3	-	-	-	3	-	3	-	-	-	1	-	-	-	3	3	3	3	3	3	-	-	-	-	34
1	61	5	5	5	-	-	-	5	-	5	-	-	5	-	-	-	-	1	1	1	1	1	-	-	1	-	-	37
1	64	-	-	2	2	-	-	-	-	-	-	2	-	-	-	-	-	-	-	2	2	-	-	2	-	-	-	12
3	65	-	1	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
3	66	1	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	4
2	67	1	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
2	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
3	69	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
4	70/71	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	0
4	72	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
3	73	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	0
4	74	1	1	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
3	75	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	2
3	76	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
3	77	1	1	1	-	-	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	6
3	78	1	1	1	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-	6
4	79	1	1	1	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	5
4	80	1	-	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	4
4	81	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2	82	1	1	1	-	-	-	1	-	20	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	23
4	83	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1
2	84	2	2	2	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	9
2	85	1	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Drainage		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0
TOTAL		33	26	34	2	2	3	25	3	51	3	5	5	67	1	2	1	11	11	15	15	13	11	4	1	0	15	361

- Not Analyzed
(1) PPM - Priority Pollutant Metals (Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn)
(2) Al - Aluminum
(3) Zn - Zinc
(4) 2,3,7,8-TCDD - 2,3,7,8-Tetrachlorodibenzo-p-dioxin
(5) Pesticides refer to 8080 and 8150 (herbicides) analytical methods
(6) TCL/TAL - Target Compound List/Target Analyte List
(7) F - Flouride
(8) Br - Bromide

* - Chloroacetophenone will be added to the SVOC list for this site
Note: The Generic QAPP contains all of the analytical methods that will be used during the RI/FS at DDMT

mgm95-DDMT-WP4/064.wk1

TAB

Section 5- Quality Assurance for Field Sampling

5.0 Field Effort QA/QC Sampling

The goal of QA in the field is to provide data of known quality to the project team to support the project decision-making process. The implementation of QA goals is the responsibility of the FTL. The FTL reports to the project manager (PM) and is responsible for the coordination of field efforts, provides for the availability and maintenance of sampling equipment and materials, and provides shipping and packing materials. The FTL supervises the completion of all chain-of-custody records, supervises the proper handling and shipping of samples, and is responsible for accurate completion of the field notebook. As the lead field representative, the FTL is responsible for consistently implementing program QA/QC measures at the site and for performing field activities in accordance with approved work plans, policies, and field procedures. Sections 3 and 4 of the *QAPP* (ref. 31) provide details to meet the goal of QA during the field investigation. This section summarizes some of the critical field QA procedures, as well as the QA/QC samples to be collected during the field investigation.

5.1 Field Documentation Summary

All field notes will be recorded in indelible ink on standard forms in bound notebooks. Section 4.3 of the *QAPP* (ref. 31) contains all information that will be recorded in the field book. A daily field log will be completed by the FTL. This log will be signed and dated daily. Significant events occurring during the day will be recorded and reported to the PM. Daily communication is essential to evaluate whether timely corrective measures are necessary. The field notebooks must provide a place for the field team members to sign and date the entries. The FTL or designated representative will conduct weekly informal audits for completeness. The following items should be included:

- Sample labels
- Chain-of-custody records
- Field notebooks
- Sampling operations
- Document control

5.2 Field Monitoring Summary

All field monitoring equipment will be calibrated according to the procedures outlined in Section 6 of the *QAPP* (ref. 31); all field procedures concerning groundwater, soil, sediment, and surface water sampling are described in Section 5. Additionally, Section 5 contains soil boring and monitoring well drilling procedures, geophysical survey and logging procedures, and all equipment decontamination procedures.

5.3 QA/QC Sampling Summary

Different types of QA/QC samples will be collected and analyzed during the RI/FS at DDMT. These samples include the following:

- Trip blanks
- Equipment blanks
- Field blanks
- Field duplicates
- Matrix spike/matrix spike duplicate (MS/MSD) samples
- Split samples

5.3.1 Trip Blanks

Trip blanks are to be analyzed for VOCs only. Three 40-milliliter (mL) VOC vials will accompany each ice chest that contains samples collected for VOC analyses. The trip blanks will be shipped to the site from the laboratory filled with American Society for Testing and Materials (ASTM) Type II water, along with sampling kits. One of the trip blanks will accompany split VOC samples to the U.S. Army Corps of Engineers (COE) QA laboratory.

5.3.2 Equipment Blanks

Equipment blanks are processed by rinsing decontaminated sampling equipment with ASTM Type II water obtained from the laboratory. The rinse water is collected in sample bottles, preserved, and handled in the same manner as the samples. Equipment blanks will be collected once a day for the equipment used during sampling procedures. Split equipment blank samples of the rinsate will be sent to the COE QA laboratory.

5.3.3 Field Blanks

Field blanks are samples of source water used for decontamination and are used to monitor the potential for contamination from the source water. One field blank will be collected from each source once a week.

5.3.4 Field Duplicates

The FTL will choose at least 10 percent of the Level 3 samples and 5 percent of the Level 2 samples from sample locations previously known to be contaminated and will collect duplicate samples from those locations. The source information will be recorded in the field notes, but not on the chain-of-custody. The identity of the duplicates will not be given to the analyst. The source of information will be forwarded to the QA reviewer to aid in the review and validation of the data. The source of the field duplicate will be clearly identified in the chain-of-custody form sent to the QA laboratory.

5.3.5 Matrix Spike/Matrix Spike Duplicate

MS/MSD samples will be collected and shipped to the laboratory for spike sample analyses. Five percent of the samples collected at the screening sites will be accompanied by spike samples. However, if an MS/MSD sample has not been collected in a 14-day time period, a spike sample will be collected and sent for sample analyses.

5.3.6 Split Samples

Water and soil split samples will be sent to the COE QA laboratory for confirmational analyses. Split samples will collected for 1 percent of all samples taken at the screening site locations.

TAB

Appendix A- References

References

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TAB

Appendix B - Existing Sampling Data

TABLE B-1
POSITIVE RESULTS IN GROUND WATER
DUNN FIELD AREA
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER		Background Well MW18	MCL	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW28	MW29	MW34	MW35	MW30	MW31	MW32	MW33
HALOGENATED VOLATILES (ug/l)																								
1,1,1-Trichloroethane	PHASE I	--	200	3J	--	--	--	5J	5	--	9	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		4J	--	--	--	4J	6	--	10	--	--	--	--	--	--	9	--	--	--	5	--	--
1,1,2,2-Tetrachloroethane	PHASE I	--	--	--	--	--	150	--	--	--	10	73	340D	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	86	--	--	--	8	11	1900D	2J	--	--	--	--	--	--	--	260D	110	--
1,1,2-Trichloroethane	PHASE I	--	--	--	--	--	7	--	--	--	--	2J	1J	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	4J	--	--	--	--	--	7	--	--	--	--	--	--	--	--	12	5	--
1,1-Dichloroethane	PHASE I	--	--	--	--	--	--	3J	3J	--	3J	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	2J	4J	--	4J	--	--	--	--	--	--	5	--	--	--	--	--	--
1,1-Dichloroethylene	PHASE I	--	7	36	--	--	--	81	60	3J	130	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		47	--	--	--	58	68	2J	160	--	--	--	--	--	--	58	--	--	--	61	--	--
1,2-Dichloroethane	PHASE I	--	5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	--	--	--	3J	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethylene	PHASE I	--	100/70(c)	--	--	3J	270D	--	--	--	6J	520D	190D	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	160	--	--	--	160	81	510D	--	--	2J	--	--	--	1J	--	11000	110	--
Carbon Tetrachloride	PHASE I	--	5	--	5J	4J	77	--	--	7	--	4J	1J	--	1J	10J	--	--	--	--	--	--	--	--
	PHASE II	--		--	10	--	40	--	--	5	3J	5	3J	--	--	17	--	--	--	--	--	11	52	--
Chloroform	PHASE I	--	100(e)	3J	2J	11	15	6	--	3J	--	6	3J	--	--	4J	--	--	--	--	--	--	--	--
	PHASE II	--		--	7	2J	10	6	--	--	6	11	10	--	--	16	--	--	--	--	--	33	12	--
Methylene chloride	PHASE I	--	5	--	--	--	--	4BJ	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		2J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	PHASE I	--	5	49	100	210	3	59	58	6	190	--	--	3J	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		74	200D	46	2J	47	54	5	240D	18	33	9	--	--	--	67	--	--	--	98	2J	--
Trichloroethene	PHASE I	--	5	25	4J	28	190D	19	21	7	140	380D	1700D	--	--	2J	--	--	--	--	--	--	--	--
	PHASE II	--		35	9	5	120	16	21	4J	390D	81	5100D	--	--	8	--	24	--	81	--	1500D	110	--
NONHALOGENATED VOLATILES (ug/l)																								
Acetone	PHASE I	3J	--	--	--	--	34B	3J	--	--	--	1JB	1JB	1JB	2JB	--	--	--	--	--	--	--	--	--
	PHASE II	--		6J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NONHALOGENATED SEMIVOLATILES (ug/l)																								
Benzoic acid	PHASE I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		3J	3J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butyl phthalate	PHASE I	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	42	--	--	--	--
N-Nitrosodiphenylamine	PHASE I	2J	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		4BJ	19B	8BJ	5BJ	3BJ	4BJ	3BJ	6BJ	4BJ	7BJ	6BJ	--	5BJ	3BJ	6BJ	--	3BJ	--	--	--	--
bis(2-Ethylhexyl) phthalate	PHASE I	5J	--	8J	7J	6J	5J	5J	5J	6J	13	--	5J	3J	6J	8J	--	--	--	--	--	--	--	--
	PHASE II	3J		7BJ	--	--	--	--	--	--	--	3BJ	--	--	--	--	--	--	--	11J	--	--	--	--

TABLE B-1
POSITIVE RESULTS IN GROUND WATER
DUNN FIELD AREA
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER		Background Well MW18	MCL	MW3	MW4	MW5	MW6	MW7	MW8	MW9	MW10	MW11	MW12	MW13	MW14	MW15	MW28	MW29	MW34	MW35	MW30	MW31	MW32	MW33
VOLATILE METALS (ug/l)																								
Arsenic	PHASE I	55	50	--	--	--	--	--	--	82	85	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	40		--	--	--	--	--	--	--	150	--	--	--	210	--	--	50	--	--	50	180	--	80
Lead	PHASE I	70	50/15(f)	238N	257N	84N	395N	390N	185N	171N	653N	353N	417N	150N	507N	255N	--	--	--	--	--	--	--	--
	PHASE II	80		90	130	40	70	260	70	--	1000	140	70	40	200	120	80	80	--	--	50	290	120	100
Mercury	PHASE I	--	2	1.8	1.1	.6	3.6	1.4	1.7	.8	.7	1.4	.5	1.4	1.9	3.1	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	1	--	1	--	1	--	--	--	2	1	--	--	--	--	--	1	1	--
NONVOLATILE METALS (ug/l)																								
Antimony	PHASE I	--	6	45BN	59BN	--	142N	170N	113N	81N	81N	54BN	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Barium	PHASE I	218	2000	859N	695N	224N	117N	1030N	994N	418N	1310N	3390N	2010N	416N	3740N	999N	--	--	--	--	--	--	--	--
	PHASE II	410		310	280	200	830	540	350	130	1000	1200	560	220	1500	550	960	410	120	120	600	880	1000	460
Cadmium	PHASE I	--	5	--	--	--	8N	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	--	--	--	--	--	--	--	--	--	9	9	--	--	--	--	--	--
Chromium (d)	PHASE I	55	100	643N	623N	170N	386N	1240N	471N	182N	268N	530N	517N	184N	800N	393N	--	--	--	--	--	--	--	--
	PHASE II	50		60	120	50	40	340	100	10	310	120	40	20	190	110	130	170	--	--	50	280	140	100
Copper	PHASE I	108	1300(g)	345N	438N	78N	213N	856N	304N	136N	613N	643N	454N	180N	592N	400N	--	--	--	--	--	--	--	--
	PHASE II	180		50	80	40	40	210	160	20	910	620	80	50	180	110	80	80	--	--	50	100	50	70
Nickel	PHASE I	29	100	324N	301N	57N	145N	602N	170N	67N	142N	225N	350N	79N	421N	170N	--	--	--	--	--	--	--	--
	PHASE II	40		40	50	20	30	170	50	--	170	60	40	20	100	80	70	80	--	--	30	130	60	50
Silver	PHASE I	--	100(h)	--	--	--	20	--	--	--	--	--	42	11	13	8B	--	--	--	--	--	--	--	--
	PHASE II	--		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Zinc	PHASE I	118	5000(h)	114N	115N	311N	517N	1810N	745N	304N	1120N	872N	1300N	407N	1840N	882N	--	--	--	--	--	--	--	--
	PHASE II	160		160	170	81	63	450	180	14	1300	230	110	78	430	140	250	210	24	38	160	490	220	230

(c) Trans isomer/Cis isomer
(d) No distinction between Chromium (III) and Chromium (VI)
(e) Total trihalomethanes
(f) MCL/ Action Level
(g) MCLG. Primary MCL is a Treatment Technique
(h) Secondary MCL

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL) but greater than the Instrument Detection Limit (IDL).
B (Organic) = Found in method blank.
D = Identified in an analysis at a secondary dilution factor.
J = Estimated value less than the sample quantitation limit but greater than zero.
N = Spiked sample recovery not within control limits.
-- = Not detected.
NA = Not Available.

TABLE B-2
POSITIVE RESULTS IN SURFACE WATER
DUNN FIELD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	Ambient Water Quality Criteria Aquatic Life (fresh) Acute	Chronic	PHASE I SW1	PHASE II SW15	PHASE II SW16
HALOGENATED VOLATILES (ug/l)					
Methylene chloride	11,000	na	1BJ	--	--
NONHALOGENATED VOLATILES (ug/l)					
Acetone	na	na	75J	18	2J
NONHALOGENATED SEMIVOLATILES (ug/l)					
Benzoic acid	na	na	--	--	3BJ
bis(2-Ethylhexyl) phthalate	940	3	--	--	10BJ
N-Nitrosodiphenylamine	na	na	--	--	5BJ
PESTICIDES (ug/l)					
Dieldrin			.13	.11	--
VOLATILE METALS (ug/l)					
Lead	82	3.2	--	40	--
NONVOLATILE METALS (ug/l)					
Barium	na	na	91B	77	56
Cadmium			6	--	--
Copper	18	12	18B	10	--
Zinc	120	110	57	110	140

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).
B (Organic) = Found in method blank.
J = Estimated value less than the sample quantitation limit, but greater than zero.
-- = Not detected.

TABLE B-3
POSITIVE RESULTS IN SURFACE SOILS
DUNN FIELD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I				PHASE II
	SS6	SS7	SS8	SS9	SS44
HALOGENATED VOLATILES (ug/kg)					
Carbon Tetrachloride	--	--	--	--	4J
Methylene chloride	44B	45B	10B	8B	8B
NONHALOGENATED VOLATILES (ug/kg)					
2-Butanone	--	--	19	--	--
2-Hexanone	--	--	2J	--	--
4-Methyl-2-pentanone	--	--	62	--	--
Acetone	8J	7J	120	19	20
Ethylbenzene	--	--	2J	--	--
Toluene	1J	2J	6	--	1J
Total xylenes	--	3J	14	--	--
NONHALOGENATED SEMIVOLATILES (ug/kg)					
2-Methylnaphthalene	--	2600	3600J	--	--
4-Methylphenol	--	300J	--	--	--
Benzoic acid	--	250J	--	--	--
bis(2-Ethylhexyl) phthalate	940J	--	--	910	1900B
Dibenzofuran	--	11000	--	--	--
N-Nitrosodiphenylamine	--	1400J	3200J	--	--
Polynuclear Aromatic Hydrocarbons (PAHs)					
Acenaphthene	--	19000	--	--	--
Acenaphthylene	--	2000J	--	--	--
Anthracene	--	21000	--	--	--
Benzo(a)anthracene	--	81000D	--	150J	200J
Benzo(a)pyrene	--	68000D	--	130J	150J
Benzo(b)fluoranthene	--	68000D	--	300J	300J
Benzo(g,h,i)perylene	--	46000D	--	150J	--
Benzo(k)fluoranthene	--	28000	--	--	--
Chrysene	--	87000D	--	210J	250J
Dibenzo(a,h)anthracene	--	26000	--	--	--
Fluoranthene	--	220000D	--	340J	510J
Fluorene	--	18000	--	--	--
Indeno(1,2,3-cd)pyrene	--	44000D	--	120J	--
Naphthalene	--	4800	--	--	--
Phenanthrene	--	160000D	--	180J	300J
Pyrene	--	160000D	2600J	270J	510J
Total PAHs	--	1,054,800	2600	1850	2220

TABLE B-3
POSITIVE RESULTS IN SURFACE SOILS
DUNN FIELD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I				PHASE II
	SS6	SS7	SS8	SS9	SS44
PESTICIDES (ug/kg)					
4,4'-DDE	160D	--	--	--	--
4,4'-DDT	170D	--	--	--	--
alpha-Chlordane	--	1500J	--	--	--
Dieldrin	330D	--	480D	64D	--
VOLATILE METALS (mg/kg)					
Arsenic	21	35	23	21	--
Lead	51	122	459	19	2
Mercury	0.04	0.06	0.06	0.04	--
NONVOLATILE METALS (mg/kg)					
Barium	99.2	105	64.5	70.3	85.2
Cadmium	1.6	1	1.1	--	--
Chromium **	12	32	--	10	27
Copper	32	54	24	18	6
Nickel	12	14	9	10	7
Sodium	--	--	82B	--	--
Zinc	102	114	300	45.1	30.2

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit
B (Organic) = Found in method blank.
D = Identified in an analysis at a secondary dilution factor.
J = Estimated value less than the sample quantitation limit, but greater than zero.
** = No distinction between Chromium III and Chromium VI.
-- = Not detected.

TABLE B-4
POSITIVE RESULTS IN SURFACE SOILS
BUILDING 1088
DEFENSE DEPOT MEMPHIS TENNESSEE

	PHASE I					PHASE II	
PARAMETER	SS15	SS16	SS17	SS18	SS19	SS45	SS46
HALOGENATED VOLATILES ug/kg							
Methylene chloride	16B	29B	11B	9B	11B	11B	8B
NONHALOGENATED VOLATILES ug/kg							
Acetone	15	17	12B	68J	11BJ	13	8J
Toluene	5J	4J	--	2J	6	2J	--
NONHALOGENATED SEMIVOLATILES ug/kg							
2,4-Dimethylphenol	--	--	--	--	720J	--	--
2-Methylphenol	--	--	--	--	1100J	--	--
4-Methylphenol	--	--	--	--	500J	--	--
Benzoic acid	--	--	--	--	320J	--	--
Benzyl alcohol	--	--	--	1000J	--	--	--
bis(2-Ethylhexyl) phthalate	1700B	4300B	600BJ	8100B	--	1200B	1400B
Butyl benzyl phthalate	98J	370J	--	--	--	--	--
Dibenzofuran	--	--	--	--	210J	--	--
Dimethyl phthalate	--	--	--	--	--	180J	--
Di-n-butyl phthalate	160J	470J	--	950J	--	--	--
N-Nitrosodiphenylamine	150J	590J	--	--	--	--	--
Phenol	--	--	--	--	550J	--	--
Polynuclear Aromatic Hydrocarbons (PAHs)							
Acenaphthene	--	--	--	--	250J	--	--
Anthracene	--	670J	200J	--	260J	--	--
Benzo(a)anthracene	--	2100J	620J	--	2200	150J	90J
Benzo(a)pyrene	--	1700J	--	370J	1500J	140J	84J
Benzo(b)fluoranthene	120J	2400J	1300J	830J	4600	180J	160J
Benzo(g,h,i)perylene	--	1400J	840J	--	--	--	--
Benzo(k)fluoranthene	100J	2200J	--	--	--	--	--
Chrysene	110J	2500J	780J	1000J	2500	220J	130J
Fluoranthene	220J	5800	1800J	1300J	3200	340J	210J
Fluorene	--	--	--	--	310J	--	--
Indeno(1,2,3-cd)pyrene	--	1200J	630J	--	1500J	120J	--
Naphthalene	--	--	--	--	460J	--	--
Phenanthrene	130J	3000J	760J	780J	2500	210J	120J
Pyrene	180J	4700	1100J	860J	2600	440J	250J
Total PAHs	840	27,670	8,040	4,770	18,920	2,050	910

TABLE B-4
POSITIVE RESULTS IN SURFACE SOILS
BUILDING 1088
DEFENSE DEPOT MEMPHIS TENNESSEE

	PHASE I					PHASE II	
PARAMETER	SS15	SS16	SS17	SS18	SS19	SS45	SS46
PESTICIDES ug/kg							
4,4'-DDD	45D	25D	52D	--	--	--	13J
4,4'-DDE	110D	1300D	97D	400D	180	33	27
4,4'-DDT	450D	7400D	260D	1100D	860	90D	110D
alpha-BHC	12Z	--	--	--	--	--	--
alpha-Chlordane	--	--	--	--	--	25J	--
beta-BHC	26Z	--	43Z	--	--	--	--
delta-BHC	--	--	11Z	--	--	--	--
Dieldrin	110Z	410Z	--	--	220	--	--
Endosulfan-I	19Z	--	--	--	--	--	--
gamma-BHC (Lindane)	11Z	--	--	--	--	--	--
gamma-Chlordane	--	--	--	--	--	31J	--
Heptachlor epoxide	69Z	--	--	--	--	--	--
PCBs ug/kg							
Aroclor-1016	100Z	--	140Z	--	--	--	--
Aroclor-1221	95Z	--	--	--	--	--	--
Aroclor-1232	270Z	--	550Z	--	--	--	--
Aroclor-1242	130Z	--	200Z	--	--	--	--
Aroclor-1254	--	10000D	--	--	--	--	--
Total PCBs	595	10,000	890	--	--	--	--
TOTAL VOLATILE METALS mg/kg							
Arsenic	6	--	--	15	--	--	--
Lead	2670G*	17500	247	2060	10300	312	155
Mercury	0.04N	0.26	--	0.06	0.18	--	--
Selenium	--	--	--	9	--	--	--
TOTAL NONVOLATILE METALS mg/kg							
Antimony	6B	30	--	26	4B	--	--
Barium	216	313	109	409	148	85.2	91.8
Cadmium	1.6N	23.4	0.7	4.7	4.4	--	--
Chromium **	714G	6710	109	8560	2230	138	78
Copper	124*	240	72	52	148	118	76
Nickel	37*	53	23	16	32	29	24
Silver	--	0.8B	--	--	--	--	--
Zinc	998G	21000	270	22100	4600	202	146

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).
B (Organic) = Found in method blank.
D = Identified in an analysis at a secondary dilution factor.
G = Native analyte > 4 times spike added, therefore acceptance criteria do not apply.
J = Estimated value less than the sample quantitation limit, but greater than zero.
N = Spiked sample recovery not within control limits.
Z = Matrix interference; compound not positively identifiable.
* = Duplicate analysis not within control limits.
** = No distinction between Chromium (III) and Chromium (VI)
-- = Not detected.

B-5 POSITIVE RESULTS (ABOVE DETECTION LIMITS) OF NOVEMBER 1993 GROUNDWATER MONITORING

ID			MW21	MW22SP	MW23	MW24	MW25	MW26	MW28	MW29
COLLECTION DATE			11/08/93	11/17/93	11/15/93	11/16/93	11/10/93	11/04/93	11/19/93	11/17/93
COLLECTION TIME			17:00	15:00	09:50	17:00	08:20	19:50	11:50	09:45
PARAMETER LIST			CDDMTW.5	CDDMTW.1	CDDMTW.1	CDDMTW.1	CDDMTW.1	CDDMTW.1	CDDMTW.1	CDDMTW.5
STORET METHOD	PARAMETER NAME	UNITS								
32101*8010-0	BROMODICHLOROMETHANE	UG/L								
32102*8010-0	CARBONTETRACHLORIDE	UG/L						3.16		
34301*8010-0	CHLOROBENZENE	UG/L								4.26
32106*8010-0	CHLOROFORM	UG/L								2.69
34496*8010-0	1,1-DICHLOROETHANE	UG/L								
34531*8010-0	1,2-DICHLOROETHANE	UG/L								32.1
34501*8010-0	1,1-DICHLOROETHYLENE	UG/L								
34546*8010-0	TRANS-1,2-DICHLORO ETHENE	UG/L								
34423*8010-0	METHYLENE CHLORIDE	UG/L								
34516*8010-0	1,1,2,2-TETRACHLORO ETHANE	UG/L								
34475*8010-0	TETRACHLOROETHENE	UG/L	49.1				112	8.59		41.1
34506*8010-0	1,1,1-TRICHLOETHANE	UG/L								
34511*8010-0	1,1,2-TRICHLOETHANE	UG/L								
39180*8010-0	TRICHLOROETHENE	UG/L	4.42	3.24				1.29		14.9
34010*8070-0	TOLUENE	UG/L								
39100*8270&320-0	BIS(2-ETHYLHEXYL) PHTHALATE	UG/L	2.4			9.6	4.0	5.8		3.4
39110*8270&320-0	DI-N-BUTYLPHTHALATE	UG/L								
34376*8270&320-0	FLUORANTHENE	UG/L								
34694*8270&320-0	PHENOL	UG/L								
34205*8100&520-0	ACENAPHTHENE	UG/L								0.283
34220*8100&520-0	ANTHRACENE	UG/L		0.008	0.003	0.009			0.035	0.013
34526*8100&520-0	BENZO(A)ANTHRACENE	UG/L								
34247*8100&520-0	BENZO(A)PYRENE	UG/L	0.003	0.010	0.003	0.004			0.006	0.008
34230*8100&520-0	BENZO(B)FLUORANTHENE	UG/L	0.003	0.015	0.006	0.005		0.003	0.006	0.010
34521*8100&520-0	BENZO(GHI)PERYLENE	UG/L								
34243*8100&520-0	BENZO(K)FLUORANTHENE	UG/L	0.001	0.005	0.003	0.002			0.004	0.004
34320*8100&520-0	CHRYSENE	UG/L								1.58
34556*8100&520-0	DIBENZ(A,H)ANTHCENE	UG/L		0.005					0.006	
34376*8100&520-0	FLUORANTHENE	UG/L	0.009	0.033	0.013	0.009		0.007	0.017	0.019
34403*8100&520-0	INDENO(1,2,3-CD) PYRENE	UG/L		0.020						
34696*8100&520-0	NAPHTHALENE	UG/L							1.20	
34461*8100&520-0	PHENANTHRENE	UG/L								
34469*8100&520-0	PYRENE	UG/L								
39330*8080&520-0	ALDRIN	UG/L								
39310*8080&520-0	DDD,PP'	UG/L								
39370*8080&520-0	DDE,PP'	UG/L								
39300*8080&520-0	DDT,PP'	UG/L								
39340*8080&520-0	DIELDRIN	UG/L								
39420*8080&520-0	HEPTACHLOR EPOXIDE	UG/L								
1105*6010-0	ALUMINUM,TOTAL	UG/L	103000	198000	196000	89900	33400	33400	143000	124000
1002*7060-0	ARSENIC,TOTAL	UG/L	4.9	6.0	67.3				98.5	44.3
1007*6010-0	BARIUM,TOTAL	UG/L	298	462	566	336	596	360	3150	329
1027*6010-0	CADMIUM,TOTAL	UG/L			13.8					
1034*6010-0	CHROMIUM,TOTAL	UG/L	272	824	428	338	104	49.3	370	209
1033*6010-0	COBALT,TOTAL	UG/L	42.7	79.8	66.7	136	103	31.5	975	58.5
1042*6010-0	COPPER,TOTAL	UG/L	142	179	210	716	90.1	93.9	196	99.8
1051*7421-0	LEAD,TOTAL	UG/L	75.2	93.5	444	24.4	31.8	17.5	119	34.5
71900*7470-0	MERCURY,TOTAL	UG/L	0.47	1.85	1.65	0.31	0.26	0.28	1.31	0.31
1092*6010-0	ZINC,TOTAL	UG/L	389	841	1530	268	148	107	657	281
70300*160.1-0	RESIDUE,DISS (TDS)	MG/L	866	788	598	181	373	260	172	628
1106*6010-0	ALUMINUM,DISS	UG/L						494		
1005*6010-0	BARIUM,DISS	UG/L	29.8	91.6	27.1	38.8	44.9	371	39.0	42.8
1040*6010-0	COPPER,DISS	UG/L								11.5
1049*7421-0	LEAD,DISS	UG/L								
1090*6010-0	ZINC,DISS	UG/L								

TABLE B-6
POSITIVE RESULTS IN SURFACE WATER
MAIN INSTALLATION
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	Ambient Water Quality Criteria Aquatic Life (from)(n) Acute	Chronic	PHASE I SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	PHASE II SW10	SW11	SW12	SW13	SW14
HALOGENATED VOLATILES (ug/l)															
Methylene chloride	11,000	na	1BJ	1BJ	--	--	--	2BJ	1BJ	1BJ	--	--	--	--	--
NONHALOGENATED VOLATILES (ug/l)															
2-Butanone			--	--	--	--	--	--	--	--	--	--	--	--	4J
Acetone	na	na	5BJ	3BJ	2BJ	2BJ	--	2BJ	2BJ	1BJ	1BJ	4J	4J	--	11D
Total xylenes	na	na	--	--	--	--	--	--	--	--	--	1J	--	--	--
NONHALOGENATED SEMIVOLATILES (ug/l)															
Benzoic acid	na	na	--	--	--	--	--	--	--	--	--	--	6BJ	5BJ	3BJ
bis(2-Ethylhexyl) phthalate	940	3	--	3BJ	3BJ	5BJ	--	2BJ	3BJ	12DJ	7BJ	3J	3BJ	6BJ	3BJ
Butyl benzyl phthalate	940	3	--	--	--	--	--	--	--	--	--	3J	--	--	--
Di-n-butyl phthalate	940	3	--	--	--	--	--	--	--	--	3J	--	--	--	--
Di-n-octyl phthalate	940	3	--	--	--	--	--	--	--	--	3BJ	--	--	--	--
Fluoranthene	na	na	--	--	--	--	--	--	--	--	--	2J	--	--	--
N-Nitrosodiphenylamine	na	na	--	--	--	3J	--	3J	--	--	2J	--	7BJ	--	--
Pyrene	na	na	--	--	--	--	--	--	--	--	3J	3J	--	--	--
PESTICIDES (ug/l)															
4,4'-DDE	1050	na	--	--	--	--	.21	--	--	--	.14	.68D	.65D	--	--
4,4'-DDT	1.1	0.001	--	--	--	--	--	--	--	.16	.27	1.9D	2.2D	--	--
Endosulfan-I			.162	--	--	--	--	--	--	--	--	--	--	--	--
VOLATILE METALS (ug/l)															
Arsenic	360	190	--	--	--	--	48	41	37	47	--	--	30	--	--
Lead	82	3.2	--	--	--	--	--	--	--	205	--	50	100	--	--
NONVOLATILE METALS (ug/l)															
Barium	na	na	76B	15B	14B	14B	17B	15B	15B	60B	26B	55	95	60	42
Cadmium			--	--	--	--	--	--	--	5	--	--	19	--	--
Chromium			20	--	--	--	--	--	--	--	--	--	20	--	10
Copper	18	12	23B	27	48	30	24B	20B	19B	68	25	30	20	--	--
Silver			--	--	--	--	--	--	--	13	--	--	--	--	--
Zinc	120	110	29	68	22	22	41	32	37	400	81	110	150	54	36

NA - Not Available

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL) but greater than the Instrument Detection Limit (IDL).

B (Organic) = Found in method blank.

D = Identified in an analysis at a secondary dilution factor.

J = Estimated value less than the sample quantitation limit but greater than zero.

Z = Matrix interference; compound not positively identifiable

-- = Not detected

TABLE B-7
POSITIVE RESULTS IN SURFACE SOILS
BX GAS STATION
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I SS25
HALOGENATED VOLATILES (ug/kg)	
Methylene chloride	25B
NONHALOGENATED SEMIVOLATILES (ug/kg)	
bis(2-Ethylhexyl) phthalate	510B
N-Nitrosodiphenylamine	58BJ
Polynuclear Aromatic Hydrocarbons (PAHs)	
Benzo(a)anthracene	54J
Benzo(e)pyrene	53J
Benzo(b)fluoranthene	62J
Benzo(g,h,i)perylene	58J
Benzo(k)fluoranthene	93J
Chrysene	76J
Fluoranthene	140J
Indeno(1,2,3-cd)pyrene	47J
Phenanthrene	76J
Pyrene	110J
Total PAHs	769
PESTICIDES (ug/kg)	
Dieldrin	36D
VOLATILE METALS (mg/kg)	
Arsenic	25
Lead	15
Mercury	0.03
NONVOLATILE METALS (mg/kg)	
Antimony	4
Barium	130
Chromium **	14
Copper	20
Nickel	19
Zinc	57.9

B (Organic) = Found in method blank.
D = Identified in an analysis at a secondary dilution factor.
J = Estimated value less than the sample quantitation limit, but greater than zero.
** = No distinction between Chromium (III) and Chromium (VI).

TABLE B–8
POSITIVE RESULTS IN SURFACE SOILS
OPEN STORAGE AREA
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I									
	SS20	SS21	SS22	SS23	SS32	SS33	SS34	SS35	SS36	SS40
HALOGENATED VOLATILES ug/kg										
1,1,2,2–Tetrachloroethane	--	--	--	19	--	--	--	--	--	--
Methylene chloride	18B	20B	20B	50B	6B	8B	11B	8B	13B	9B
Trichloroethene	--	--	--	2J	--	--	--	--	--	4J
NONHALOGENATED VOLATILES ug/kg										
2–Butanone	--	--	--	--	--	--	--	--	8J	--
Acetone	8BJ	6JB	8JB	22	7JB	10JB	13B	11B	23B	31
Benzene	--	--	--	4J	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--	--	--	4J
Toluene	17	12	20	33	3J	2J	8	--	4J	34
Total xylenes	1J	--	3J	--	--	--	--	--	--	9
HALOGENATED SEMIVOLATILES ug/kg										
Pentachlorophenol	--	310J	--	--	--	--	--	--	--	--
NONHALOGENATED SEMIVOLATILES ug/kg										
2–Methylnaphthalene	260J	--	--	--	--	--	--	--	--	--
bis(2–Ethylhexyl) phthalate	2300B	--	470BJ	410BJ	350BJ	320BJ	340BJ	390B	440BJ	--
Benzoic acid	--	--	--	--	--	--	--	43J	--	--
N–Nitrosodiphenylamine	--	--	--	--	--	49BJ	35BJ	63BJ	--	--

(continued on next page)

TABLE B–8
POSITIVE RESULTS IN SURFACE SOILS
OPEN STORAGE AREA
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I									
	SS20	SS21	SS22	SS23	SS32	SS33	SS34	SS35	SS38	SS40
Polynuclear Aromatic Hydrocarbons (PAHs)										
Benzo(a)anthracene	--	--	--	230J	--	--	--	--	--	--
Benzo(b)fluoranthene	350J	500J	290J	600J	--	--	--	--	--	--
Benzo(g,h,i)perylene	--	--	--	2100J	--	--	--	--	--	--
Chrysene	360J	260J	--	270J	--	--	--	--	--	--
Dibenzo(a,h)anthracene	--	--	--	2100J	--	--	--	--	--	--
Fluoranthene	--	350J	--	400J	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	--	--	--	230J	--	--	--	--	--	--
Pyrene	660J	290J	200J	360J	--	--	--	--	--	--
Total PAHs	776	1,400	490	6,060	--	--	--	--	--	--
PESTICIDES ug/kg										
4,4'-DDD	--	24	--	--	--	--	--	--	--	--
4,4'-DDE	490D	150D	50D	65D	--	--	--	--	--	--
4,4'-DDT	1800D	250D	120D	210D	--	--	--	--	--	--
beta-BHC	--	53Z	32Z	--	--	--	--	--	--	--
Dieldrin	--	120D	78D	160D	--	--	--	--	--	--
Endosulfan-I	--	--	--	16Z	--	--	--	--	--	--
Toxaphene	--	--	--	370Z	--	--	--	--	--	--

TABLE B–8
POSITIVE RESULTS IN SURFACE SOILS
OPEN STORAGE AREA
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I									
	SS20	SS21	SS22	SS23	SS32	SS33	SS34	SS35	SS36	SS40
PCBs ug/kg										
Aroclor-1016	--	100Z	--	--	--	--	--	--	--	--
Aroclor-1232	--	400Z	--	--	--	--	--	--	--	--
Aroclor-1242	--	150Z	--	--	--	--	--	--	--	--
Aroclor-1254	--	--	--	220Z	--	--	--	--	--	--
Aroclor-1260	--	--	--	320Z	--	--	--	--	--	--
Total PCBs	--	650	--	550	--	--	--	--	--	--
VOLATILE METALS mg/kg										
Arsenic	15	--	--	23	8	20	8	30	25	21
Lead	7680	137	43	112	4	12	4	12	21	19
Mercury	0.18	0.04	--	0.04	--	0.04	--	0.04	0.04	--
Selenium	12	--	--	--	--	--	--	--	--	--
NONVOLATILE METALS mg/kg										
Antimony	27	8B	--	12	--	4	--	4	--	--
Barium	6540	45.2	25.8B	96.9	18.8	80.5	12	126	89.9	22.8
Cadmium	5.4	--	--	--	--	--	--	--	--	1
Chromium **	18200	115	30	34	10	13	10	13	15	32
Copper	41	21	10	30	5	15	4	20	16	10
Nickel	24	48	38	9	4	14	4	17	14	4
Silver	1.3B	--	--	--	--	--	--	--	--	--
Zinc	28200	268	75	187	9.4	46.8	6.9	59.8	53	132

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

B (Organic) = Found in method blank.

D = Identified in an analysis at a secondary dilution factor.

J = Estimated value less than the sample quantitation limit, but greater than zero.

Z = Matrix interference; compound not positively identifiable.

** = No distinction between Chromium (III) and Chromium (VI)

-- = Not detected.

TABLE B-9
POSITIVE RESULTS IN SURFACE SOILS
DRMR YARD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I					PHASE II
	SS1	SS2	SS3	SS4	SS5	SS41
HALOGENATED VOLATILES ug/kg						
Methylene chloride	7100B	9B	14B	16B	41B	15B
NONHALOGENATED VOLATILES ug/kg						
Acetone	--	--	8J	8J	4J	12
Toluene	--	6	17	--	2J	13
Total xylenes	--	4J	11	--	--	--
NONHALOGENATED SEMIVOLATILES ug/kg						
Benzoic acid	840J	--	--	--	230J	--
bis(2-Ethylhexyl) phthalate	630J	--	--	420J	2900	290BJ
Butyl benzyl phthalate	--	--	--	--	4700	--
Dibenzofuran	--	--	--	--	290J	--
N-Nitrosodiphenylamine	--	--	580J	--	--	--
Polynuclear Aromatic Hydrocarbons (PAHs)						
Acenaphthene	--	--	--	--	650J	--
Acenaphthylene	--	--	--	--	350J	--
Anthracene	6100	--	--	--	2000	--
Benzo(a)anthracene	--	--	--	--	8500	120J
Benzo(a)pyrene	--	--	--	--	6200	--
Benzo(b)fluoranthene	--	--	--	--	8200	210J
Benzo(g,h,i)perylene	--	--	--	--	5000	--
Benzo(k)fluoranthene	--	--	--	--	7600	--
Chrysene	490J	--	--	--	7400	170J
Dibenzo(a,h)anthracene	--	--	--	--	2600	--
Fluoranthene	--	--	--	100J	15000	370J
Fluorene	--	--	--	--	690J	--
Indeno(1,2,3-cd)pyrene	--	--	--	--	4000	--
Phenanthrene	--	--	--	100J	7700	200J
Pyrene	3100	--	570J	--	17000	290J
TOTAL PAHs	9,690	--	570	200	92,990	1,360

TABLE B-9
POSITIVE RESULTS IN SURFACE SOILS
DRMR YARD
DEFENSE DEPOT MEMPHIS TENNESSEE

	PHASE I					PHASE II
PARAMETER	SS1	SS2	SS3	SS4	SS5	SS41
PESTICIDES ug/kg						
4,4'-DDD	--	--	--	--	260	--
4,4'-DDE	--	290D	250	--	1100D	21
4,4'-DDT	--	1500D	1400D	--	5900D	130D
beta-BHC	--	--	--	--	--	10Z
Dieldrin	--	--	--	65D	--	--
Endosulfan sulfate	--	--	--	--	360	--
VOLATILE METALS mg/kg						
Arsenic	4*	18*	26*	33	20	--
Lead	66N	96N	129N	22	2420	978
Mercury	--	0.030	0.030	0.050	0.460	--
NONVOLATILE METALS mg/kg						
Antimony	--	--	--	--	22	--
Barium	5.8B	43.4	19.2B	97.8	273	311
Cadmium	--	4	1.6	1.0	159	0.8
Chromium **	15	19	17	14	298	144
Copper	246*G	25*G	34*G	26	1590	42
Nickel	3.0B	6.0B	3.0B	14	148	6.0
Silver	--	--	--	--	2.5	--
Zinc	22*	130*	92.4*	80.7	2160	265

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

B (Organic) = Found in method blank.

D = Identified in an analysis at a secondary dilution factor.

G = Native analyte > 4 times spike added, therefore acceptance criteria do not apply.

J = Estimated value less than the sample quantitation limit, but greater than zero.

N = Spiked sample recovery not within control limits.

Z = Matrix interference; compound not positively identifiable.

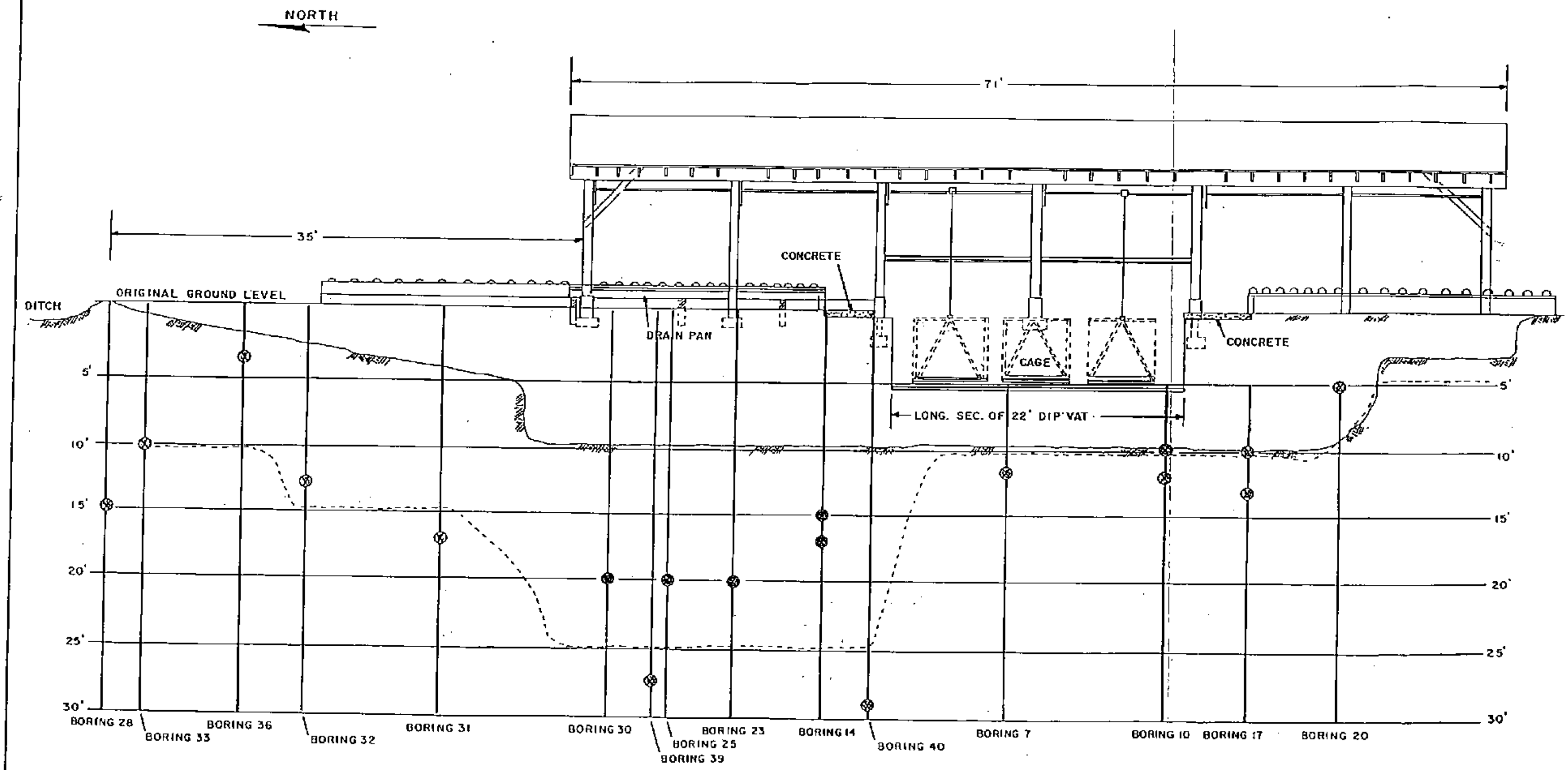
* = Duplicate analysis not within control limits.

** = No distinction between Chromium (III) and Chromium (VI)

-- = Not detected

Summary Report
On-Site Remedial Activities
at the Defense Depot Memphis

O.H. Materials Company
February 1986



RED SAMPLE POINT=>200 PPB TOTAL DIOXINS AND FURANS
BLUE SAMPLE POINT=<200 PPB TOTAL DIOXINS AND FURANS
------ THEORIZED CONTAMINATION LIMITS (SEE FIGURE 6)

Figure B-1

Longitudinal Cross-Section of Building 737 Showing Extent of Contamination

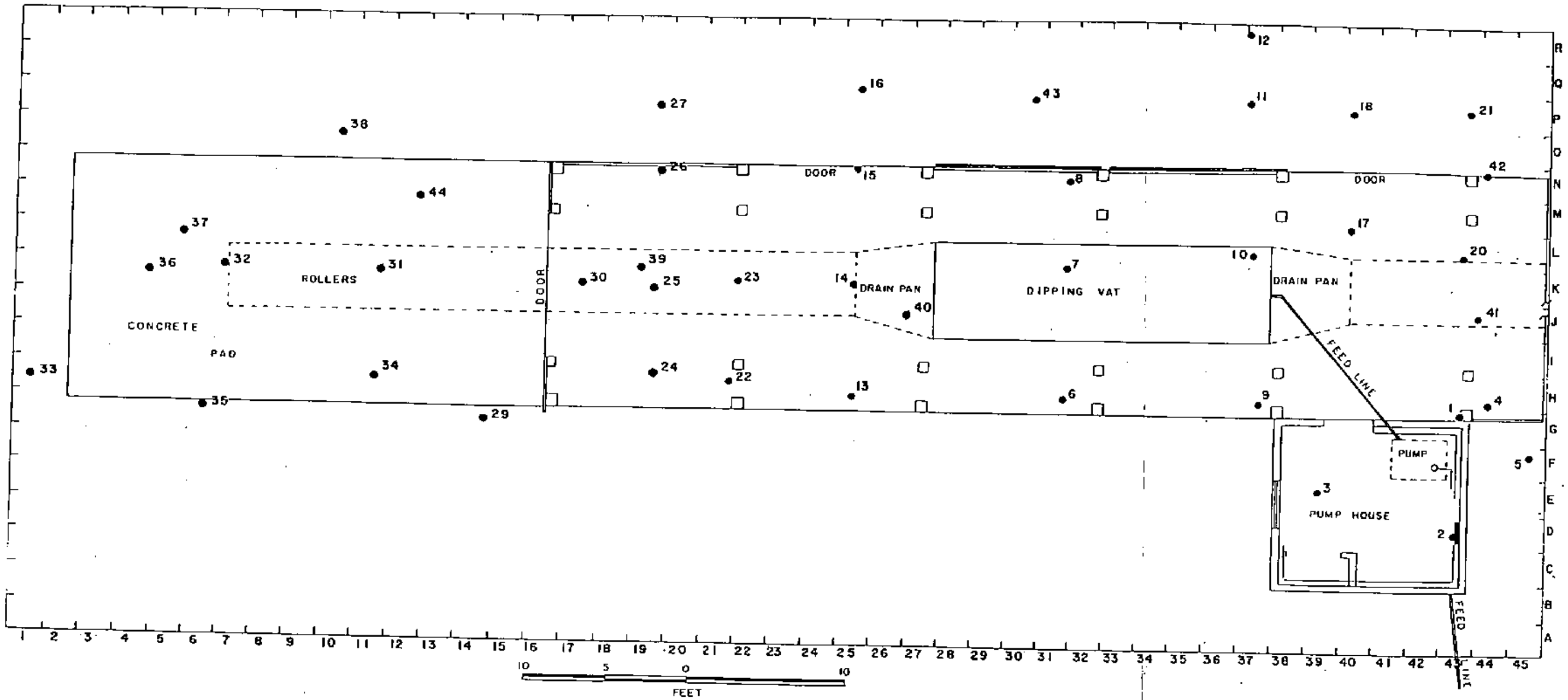


Figure B-2 Borehole Locations in Building 737.

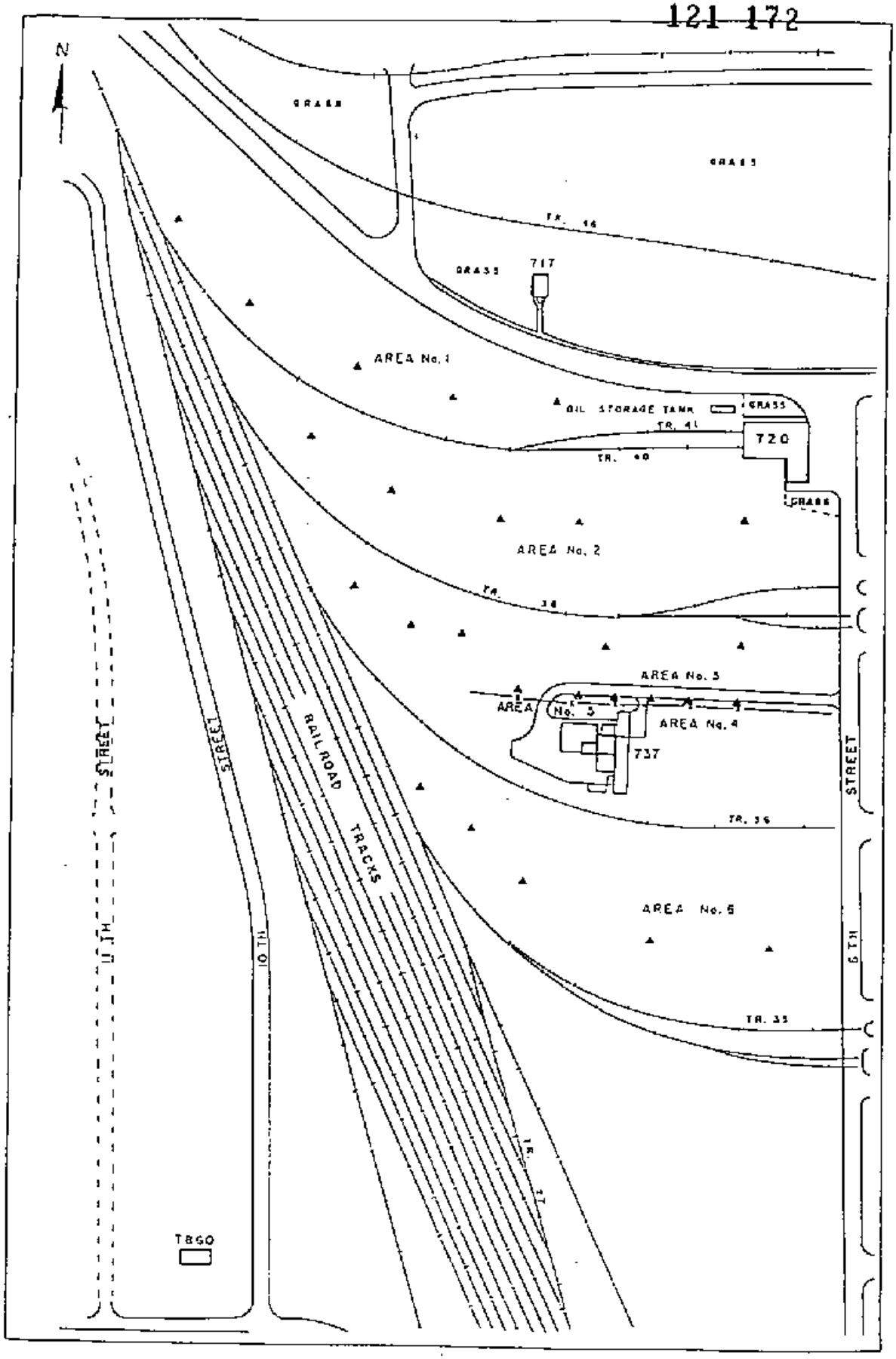


Figure B-3 Sample Points of Graveled Area

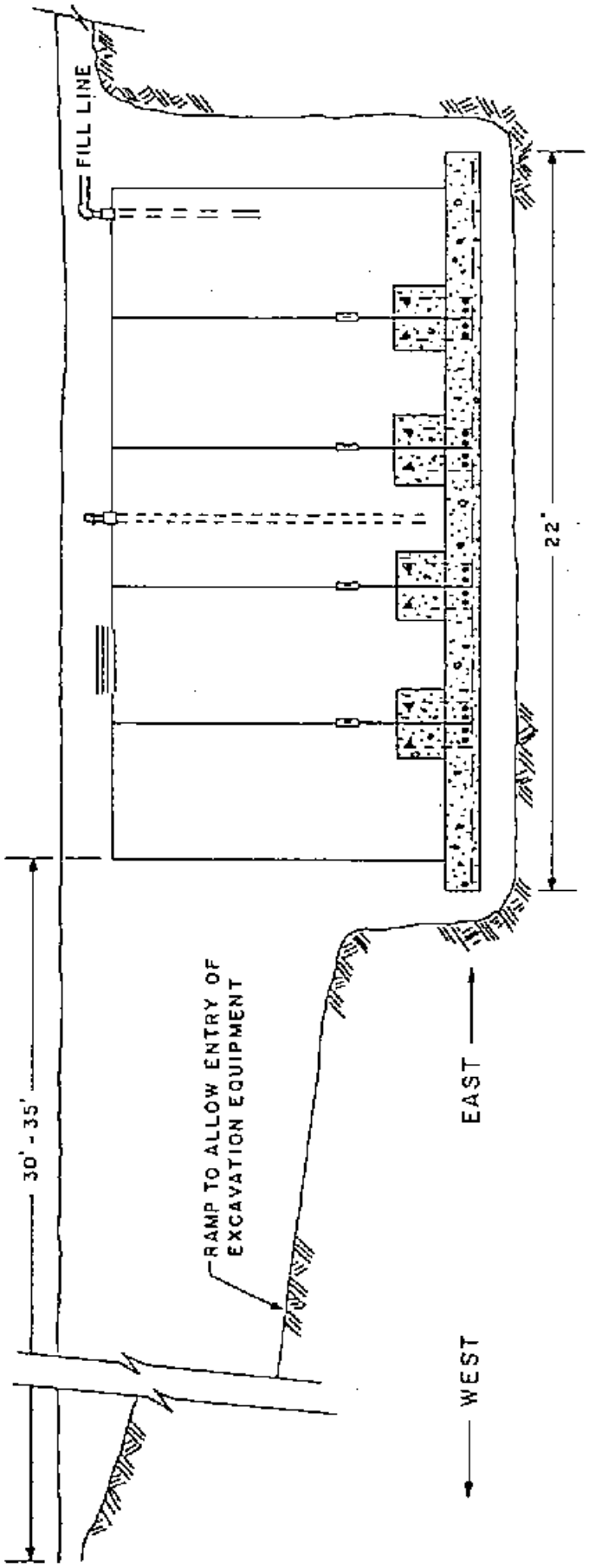


Figure B-4 Longitudinal View of PCP Storage Tank Excavation

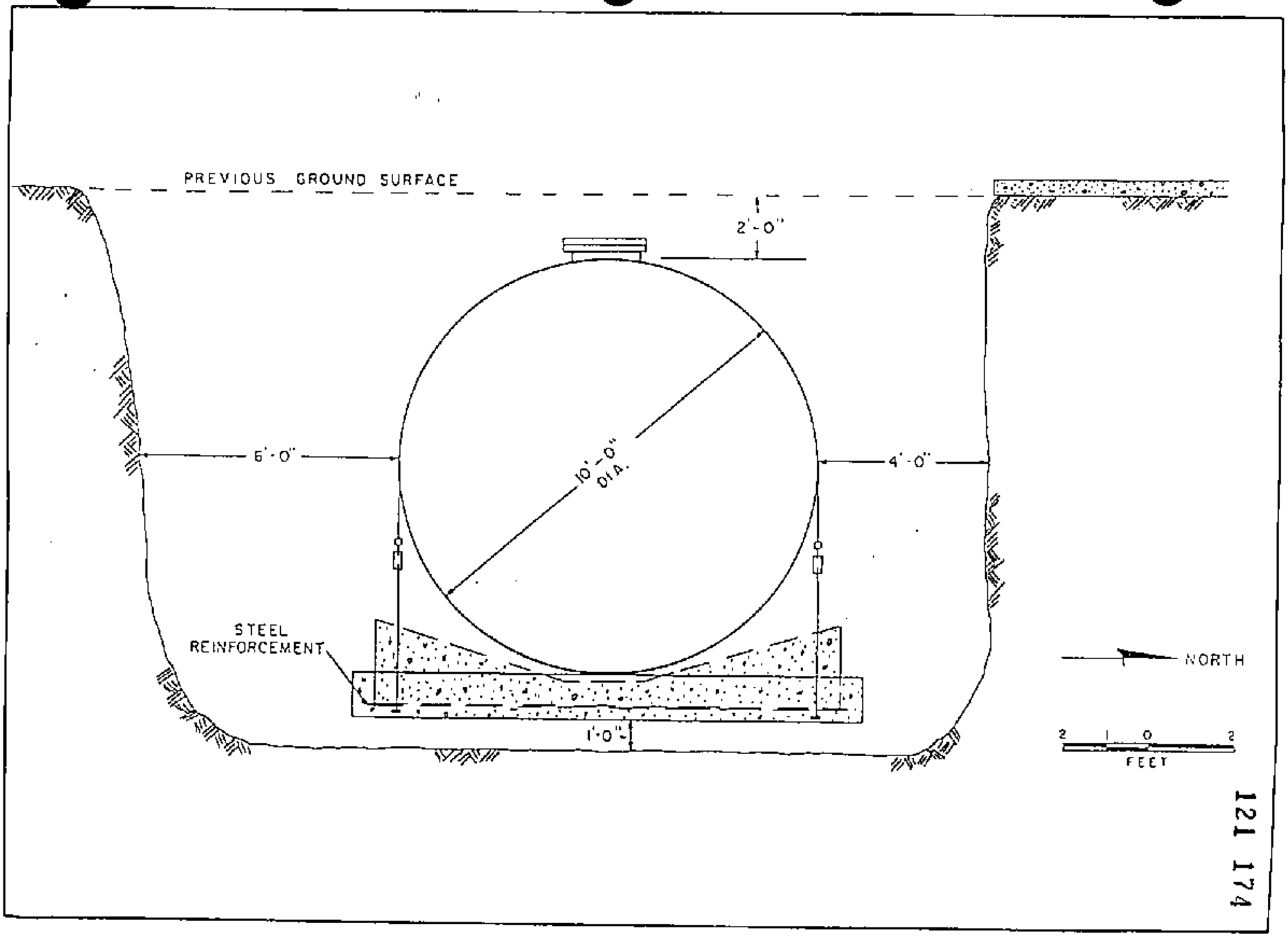


Figure B-5 East-West View of Storage Tank Excavation.

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	[1]DIOXINS					[2]FURANS				
		TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
7	Oil from PCP Vat	<2.5	<11.0	624.0	58,400	128,000	<2.0	<3.0	3,800	91,600	116,000
113	Sludge from PCP Vat	>10.0	10.0	>10.0	>280	0.1%	>10	16.0	>10.0	2,000	.1%
162	Composite of Sandblasting sand from Bldg. & Vat	<0.07	<0.2	<0.3	13	34	<0.1	<0.2	<0.2	12	15
166	Water Sample from Carbon Filter (in ng/l)	<1.0	<1.0	<2.0	<3.0	<6.0	<1.0	<1.0	<2.0	<3.0	<6.0

[1]TCDD=tetrachlorodibenzo-p-dioxin
PCDD=pentachlorodibenzo-p-dioxin
HxCDD=hexachlorodibenzo-p-dioxin
HpCDD=heptachlorodibenzo-p-dioxin
OCDD=octachlorodibenzo-p-dioxin

[2]TCDF= tetrachlorodibenzofuran
PCDF=pentachlorodibenzofuran
HxCDF==hexachlorodibenzofuran
HpCDF=heptachlorodibenzofuran
OCDF=octachlorodibenzofuran

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	HOLE	DEPTH (ft)	GRID LOCATION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
234	#29	5	G-14	<0.1	<0.1	<0.5	0.5	2.9	<0.1	<0.1	<05	<0.5	1.1
235	#30	20	K-17	<0.1	<0.1	1.1	46	250	<0.1	<0.1	7.2	100	130
236	#31	17	K-11	<0.1	<0.1	<0.5	0.9	5.2	<0.1	<0.1	<0.5	0.7	1.9
237	#32	13	K-6	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
238	#33	10	H-1	0.4	<0.1	<0.5	<0.5	3.0	<0.1	<0.1	<0.5	<0.5	<1.0
239	#34	10	H-11	<0.1	<0.1	<0.5	1.1	3.5	<0.1	<0.1	<0.5	1.3	1.7
240	#34	13	H-11	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
241	#35	5	G-6	<0.1	<0.1	2.2	33	91	0.1	0.5	9.8	53	41
242	#36	4	K-4	<0.1	<0.1	<0.5	<1.0	<0.1	<0.1	<0.1	<0.5	<0.5	<1.0
243	#37	5	L-5	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	0.2	<0.5	<0.5	<1.0
244	#38	5	O-10	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
245	#39	27	K-18	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
246	#40	29	J-27	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
248	#41	5	J-44	<0.1	<0.1	<0.5	3.2	8.0	<0.1	<0.1	<0.5	1.9	1.1
249	#42	5	N-45	<0.1	<0.1	4.7	84	250	<0.1	1.0	21	140	110
250	#43	5	P-31	<0.1	<0.1	<0.5	7.5	25	<0.1	<0.1	1.9	13	10
251	#44	10	M-12	<0.1	<0.1	<0.5	<0.5	1.9	<0.1	<0.1	<0.5	<0.5	<1.0
252	#44	14	M-12	<0.1	<0.1	<0.5	<0.5	2.7	<0.1	<0.1	<0.5	<0.5	<1.0

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
62	40 Ft. E. of PCP Bldg, Composite	0.3									
63	Field blank, N. of Bldg 529, discrete	<0.05									
64	Drainage Ditch N. End of Process Line, Area 4	<0.05									
66	End of Process Line in Front of Pest Shop, Area 5	0.85									
68	Far North Area From PCP Bldg., Composite, Area 1	<0.05									
69	Next Area to the South, Composite, Area 2	5.6									
70	Next Area to the South, Composite, Area 3	<0.05									
71	Area Adjacent and South of PCP Bldg, Composite, Area 6	<0.05									
72	Outfall Between Gate #9 and Perry Road, sediment	<0.05									
114	Area #1, 0-4", North of PCP Bldg.	0.1	<0.1	10.0	230.0	1600	0.3	<0.1	9.2	190.0	230.0

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
115	Area #2, 0-4"	0.1	0.4	5.4	59.0	54	<0.05	<0.1	11.0	47.0	21.0
116	Area #3, "	0.1	<0.1	2.4	38.0	100	<0.05	<0.1	8.4	67.0	20.0
117	Area #4, "	0.3	1.6	7.5	82.0	190	<0.05	<0.1	20.0	70.0	30.0
118	Area #5, "	0.5	2.2	3.5	91.0	720	<0.05	<0.1	23.0	120.0	120.0
119	Area #6, "	<0.05	<0.1	1.6	15.0	35	<0.05	<0.1	1.8	7.3	3.3
120	Area #1, 4-8"	<0.05	<0.1	3.7	63.0	330	<0.05	<0.1	5.7	50.0	48.0
121	Area #2, "	<0.05	<0.1	1.6	22.0	110	<0.05	<0.1	1.4	16.0	14.0
122	Area #3, "	<0.05	<0.1	<0.2	6.1	21	<0.05	<0.2	<0.2	4.9	4.9
123	Area #4, "	0.1	<0.1	3.1	46.0	180	0.2	<0.1	6.7	37.0	31.0
124	Area #5, "	<0.05	<0.1	0.6	8.9	53	<0.05	<0.1	1.1	7.4	9.1
125	Area #6, "	<0.05	<0.1	<0.2	49.0	270	<0.05	<0.1	<0.2	36.0	34.0
247	Composite of Field, South of PCP Bldg., Storage Tank Decon Area	0.05	2.2	17.0	230.0	1200	0.8	9.9	53.0	110.0	180.0

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
73*	Soil from pit south of storage tank, composite	<0.05									
74*	Soil, top two feet of pit, composite	<0.05									
112	Soil, west end of tank, composite	<0.05	0.9	30	>3400	>7700	<0.05	2.1	220	>6200	>5100
126	One foot from surface, east wall, composite	0.4	<0.1	2.0	76	240	0.7	<0.1	13	220	120
127	North wall, 5 feet deep, composite	1.1	<0.1	<0.1	4.8	10.0	3.0	<0.1	1.1	10	6
128	Bottom of hole, after tank removal, composite	<0.05	0.2	2.7	62	150	0.2	0.5	15	150	77
129	Scale from outside of tank, composite	<0.1	<0.1	.02	66	310	<0.1	<0.1	13	120	80
133	South wall surface, composite	<0.06	<0.1	<0.2	1.8	9.2	<0.05	<0.1	<0.2	1.3	2.2
134	North wall, surface, composite	<0.05	<0.1	<0.2	<0.4	8.8	<0.05	<0.1	<0.2	<0.4	25
135	East wall, 1 ft. below pipe, discrete sample	0.09	0.3	4.0	25	120	<0.05	<0.1	6.7	53	64

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
65	Soil along Process Line, Composite	5.3									
103	Field Blank (Wipe)	<0.05	<0.1	<0.2	3.9	17	<0.05	<0.1	<0.2	<0.4	11
104	Sheet Metal, Wipe, S.E. of Bldg, 100cm^2	<0.05	<0.1	<0.2	<0.4	25	<0.05	<0.1	<0.2	<0.4	25
105	Sheet Metal, Wipe, N.E. of Bldg, 100cm^2	<0.05	<0.1	<0.2	<0.4	25	<0.05	<0.1	<0.2	<0.4	14
106	Cinder Block Wall, Chips, 4"x4"	11	38	12	0.6	0.9	31	48	24	<0.4	<0.5
107	Outside Concrete Pad, end of rollers, 3"x3"	0.6	4.3	63	>2200	>4300	<0.1	3.5	28	340	310
108	Middle Wood Beam, Chips, 4"x4"	<0.05	<0.1	<0.2	31	130	<0.05	<0.1	<0.2	9.6	14
109	Metal Beam, middle section, Wipe, 100cm^2	<0.05	<0.1	<0.2	3.1	13	<0.05	<0.1	<0.2	<0.4	5
110	Wood Beam by Vat, Wood Chips, 4"x4"	0.4	3.7	91	>3300	>7600	1.0	6.8	63	>2200	>1400
111	Concrete Floor next to Vat, Chips, 3"x3"	2.3	16	280	>9800	>8700	7.9	19	390	>7500	>3100
172	1 ft. below PCP Vat, Soil, South End, Discrete	0.2	3.9	14	420	1100	<0.01	2.1	68	1100	750
173	2 ft. below PCP Vat, Soil, South End, Discrete	1.4	2.7	11	170	140	2.7	1.4	19	140	110

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	HOLE	DEPTH (ft)	GRID LOCATION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
190	#1	10	G-44	0.4	0.7	0.9	3.9	12	0.3	0.1	1.0	2.4	7.5
192	#2	10	D-44	0.1	0.2	<0.5	<0.5	6.3	0.1	0.2	<0.5	<0.5	<1.0
194	#3	5	E-40	0.1	3.4	26	670	1600	0.2	3.1	100	1300	1000
195	#3	10	E-40	<0.1	<0.1	1.3	14	22	<0.1	<0.1	3.5	26	17
198	#4	5	H-45	<0.1	<0.1	0.9	13	32	<01	<0.1	2.6	20	18
199	#5	5	F-46	<0.1	<0.1	<0.5	6.9	17	<0.1	0.1	1.3	9.2	8.5
201	#6	10	H-32	<0.1	<0.1	<0.5	<0.5	1.7	<0.1	<0.1	<0.5	0.8	<1.0
202	#6	12	H-32	0.07	<0.1	<0.5	1.3	5.0	<0.1	<0.1	<0.5	0.7	<1.0
203	#7	12	K-32	<0.1	<0.1	<0.5	1.3	10	<0.1	<0.1	<0.5	0.7	1.0
205	#6	5	H-32	0.2	<0.1	<0.5	1.8	10	<0.1	<0.1	<0.5	2.0	2.6
206	#8	5	N-32	0.1	0.2	<0.5	<0.5	12	0.1	0.2	<0.5	0.5	2.9
208	#9	10	H-38	<0.1	<0.1	<0.5	<0.5	4.8	<0.1	<0.1	<0.5	<0.5	1.4
210	#10	10	L-38	0.2	1.8	75	2100	4600	<0.1	4.0	320	2800	2300
211	#10	12	L-38	<0.1	<0.1	<0.5	<0.5	1.6	<0.1	<0.1	<0.5	<0.5	<1.0
212	#11	10	O-38	<0.1	<0.1	<0.5	<0.5	1.0	<0.1	<0.1	<0.5	<0.5	<1.0
214	#12	5	R-38	<0.1	0.1	<0.5	3.5	9.1	<0.1	0.1	<0.5	2.0	3.4
215	#13	15	H-26	<0.1	<0.1	<0.5	2.5	4.2	<0.1	<0.1	<0.5	2.5	13
216	#13	17	H-26	<0.1	<0.1	<0.5	<0.5	2.7	<0.1	<0.1	<0.5	<0.5	<1.0

TABLE 8-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	HOLE	DEPTH (ft)	GRID LOCATION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
217	#14	15	K-26	<0.1	0.1	7.2	110	160	<0.1	0.7	38	210	98
218	#14	17	K-26	<0.1	0.1	4.9	150	510	0.1	0.2	25	250	290
219	#15	15	N-26	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
220	#16	5	P-26	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
221	#17	10	L-41	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
222	#17	13	L-41	<0.1	<0.1	<0.5	<0.5	1.8	<0.1	<0.1	<0.5	<0.5	<1.0
223	#18	10	P-41	<0.1	<0.1	<0.5	<0.5	2.1	<0.1	<0.1	<0.5	<0.5	<1.0
224	#19	5	R-41	<0.1	<0.1	<0.5	1.5	5.0	<0.1	<0.1	<0.5	2.6	2.4
225	#20	5	L-44	<0.1	<0.1	<0.5	<0.5	<1.0	<0.1	<0.1	<0.5	<0.5	<1.0
226	#21	5	P-44	<0.1	<0.1	<0.5	2.7	6.4	<0.1	<0.1	<0.5	4.0	3.0
227	#22	5	H-23	<0.1	<0.1	<0.5	23	73	<0.1	<0.1	3.7	48	46
228	#23	20	K-23	<0.1	0.2	7.5	180	380	<0.1	0.9	35	280	300
229	#24	20	H-19	<0.1	0.1	<0.5	1.7	6.3	<0.1	0.1	<0.5	1.9	3.3
230	#25	20	K-19	0.4	0.7	24	270	260	0.6	3.1	59	260	260
231	#26	15	N-19	<0.1	<0.1	<0.5	2.4	6.6	<0.1	0.1	<0.5	3.4	4.1
232	#27	5	P-19	<0.1	0.1	<0.5	1.0	2.0	<0.1	0.1	<0.2	1.2	1.3
233	#28	15	Far Left, Fig. 5	<0.1	<0.1	<0.5	0.8	1.9	<0.1	<0.1	<0.2	0.5	1.5

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
136	West wall, surface composite	<0.05	<0.1	0.2	2.5	14	<0.05	<0.1	<0.2	3.6	6.3
137	East wall, 2 ft. below pipe, discrete	<0.06	<0.1	<0.2	1.3	11	<0.05	<0.1	<0.2	<1.0	3.8
149*	Soil composite, NW pile of dirt	0.6	<0.1	1.8	10	40	0.1	1.9	13	15	32
150*	Soil composite, west end of tank	0.6	0.1	1.5	5.5	20	0.2	1.1	7.8	6.0	13
151	Soil composite, east end of tank	0.6	1.9	22	440	>2000	2.9	14.8	110	810	>700
153	Soil above concrete pad supporting chocks, middle to west, composite	<0.8	<0.5	1.4	28	110	0.3	0.7	5.0	41	36
155	Concrete slab, chips, storage tank excavation	<0.1	<0.1	<0.5	<0.5	8.1	<0.1	<0.1	<0.5	<0.5	3.2
160	Soil above concrete pad supporting chocks, middle to east	<0.2	0.2	3.8	47	150	0.6	3.0	9.6	55	48
163	SE corner of storage tank hole, composite after pad removal	<0.1	<0.1	<0.5	<0.5	3.8	<0.1	<0.1	<0.5	<0.5	<1.0
164	NE corner of storage tank hole, composite, after pad removal	<0.5	0.8	1.7	120	820	0.3	0.8	21	460	640

TABLE B-10 MISCELLANEOUS SAMPLE RESULTS BUILDING 737 OPERATIONS (IN UG/KG EXCEPT AS INDICATED)

SAMPLE NO.	DESCRIPTION	TCDD	PCDD	HxCDD	HpCDD	OCDD	TCDF	PCDF	HxCDF	HpCDF	OCDF
165	Cmposite of base of storage tank, underneath concrete pad	<0.1	<0.1	<0.9	34	120	<0.1	<0.1	9.0	110	110
174	NE corner of storage tank hole, underneath pad	<0.1	<0.1	<0.5	4.2	18	<0.1	<0.1	0.7	8.1	6.5
175	Bottom composite of storage tank hole	4.4	1.0	1.3	23	72	55	1.0	1.3	29	34
253	Storage tank hole, NE corner	<0.1	<0.1	3.8	110	400	<0.1	1.8	18	180	200
254	Storage tank hole, bottom, after rain	0.5	0.9	11	130	250	1.4	8.4	68	300	150
255	Storage tank hole, Midpoint west, under concrete pad	0.4	0.6	8.4	200	550	0.8	2.9	66	580	500

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TABLE B-11
POSITIVE RESULTS IN SUBSURFACE SOILS
DEFENSE DEPOT MEMPHIS TENNESSEE

	PHASE I														
PARAMETER	STB-1-1	STB-1-2	STB-1-3	STB-2-1	STB-2-2	STB-2-3	STB-3-1	STB-3-2	STB-3-3	STB-4-1	STB-4-2	STB-4-3	STB-5-1	STB-5-2	STB-5-3
Depth of Sample:	35.5'	62.5'	73.5'	18.0'	17.5'	67.5'	21.0'	28.0'	53.0'	19.0'	26.0'	102.0'	16.0'	78.0'	83.0'
HALOGENATED VOLATILES ug/kg															
Chloroform	--	6	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene chloride	16B	19B	10B	7B	6B	12B	3J	5J	3J	2J	16B	19B	13B	21B	12B
NONHALOGENATED VOLATILES ug/kg															
2-Butanone	--	--	--	--	--	--	--	--	--	18	--	--	--	--	--
Acetone	57	43	20	24B	12B	13B	--	--	30	81	8J	17	18	14B	14
Toluene	--	--	--	--	--	--	--	--	--	1J	--	--	--	--	--
NONHALOGENATED SEMIVOLATILES ug/kg															
Benzoic acid	--	--	--	--	--	58J	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl) phthalate	120J	120J	78BJ	110J	190J	160J	2000B	67BJ	91BJ	61BJ	150BJ	56BJ	45BJ	44BJ	32BJ
Di-n-butyl phthalate	--	--	--	--	21BJ	10BJ	14BJ	17BJ	12BJ	--	--	--	--	--	--
N-Nitrosodiphenylamine	--	--	--	43JB	--	--	--	--	--	--	44J	--	--	--	--
Polynuclear Aromatic Hydrocarbons (PAHs)															
Fluoranthene	--	--	--	--	51J	47J	--	--	--	--	--	--	--	--	--
Pyrene	--	--	--	--	40J	40J	--	--	--	--	--	--	--	--	--
TOTAL PAHs	--	--	--	--	91	87	--	--	--	--	--	--	--	--	--
NONVOLATILE METALS															
Barium (EPTOX in ug/l)	15	25	58	--	--	--	16	15	49	--	--	25	--	10	--
Cadmium (EPTOX in ug/l)	--	12	5	20	6	--	7	--	--	--	--	--	--	--	--

B (Organic) = Found in method blank.
J = Estimated value less than the sample quantitation limit, but greater than zero.
-- = Not detected

TABLE B-12
POSITIVE RESULTS IN SURFACE SOILS
DRMR YARD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I					PHASE II
	SS1	SS2	SS3	SS4	SS5	SS41
HALOGENATED VOLATILES ug/kg						
Methylene chloride	7100B	9B	14B	16B	41B	15B
NONHALOGENATED VOLATILES ug/kg						
Acetone	--	--	8J	8J	4J	12
Toluene	--	8	17	--	2J	13
Total xylenes	--	4J	11	--	--	--
NONHALOGENATED SEMIVOLATILES ug/kg						
Benzoic acid	840J	--	--	--	230J	--
bis(2-Ethylhexyl) phthalate	630J	--	--	420J	2900	290BJ
Butyl benzyl phthalate	--	--	--	--	4700	--
Dibenzofuran	--	--	--	--	290J	--
N-Nitrosodiphenylamine	--	--	580J	--	--	--
Polynuclear Aromatic Hydrocarbons (PAHs)						
Acenaphthene	--	--	--	--	650J	--
Acenaphthylene	--	--	--	--	350J	--
Anthracene	6100	--	--	--	2000	--
Benzo(a)anthracene	--	--	--	--	8600	120J
Benzo(a)pyrene	--	--	--	--	6200	--
Benzo(b)fluoranthene	--	--	--	--	8200	210J
Benzo(g,h,i)perylene	--	--	--	--	5000	--
Benzo(k)fluoranthene	--	--	--	--	7600	--
Chrysene	490J	--	--	--	7400	170J
Dibenzo(a,h)anthracene	--	--	--	--	2600	--
Fluoranthene	--	--	--	100J	15000	370J
Fluorene	--	--	--	--	690J	--
Indeno(1,2,3-cd)pyrene	--	--	--	--	4000	--
Phenanthrene	--	--	--	100J	7700	200J
Pyrene	3100	--	570J	--	17000	290J
TOTAL PAHs	9,690	--	570	200	92,990	1,360

TABLE B-12
POSITIVE RESULTS IN SURFACE SOILS
DRMR YARD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I					PHASE II
	SS1	SS2	SS3	SS4	SS5	SS41
PESTICIDES ug/kg						
4,4'-DDD	--	--	--	--	260	--
4,4'-DDE	--	290D	250	--	1100D	21
4,4'-DDT	--	1500D	1400D	--	5900D	130D
beta-BHC	--	--	--	--	--	10Z
Dieldrin	--	--	--	65D	--	--
Endosulfan sulfate	--	--	--	--	360	--
VOLATILE METALS mg/kg						
Arsenic	4*	18*	26*	33	20	--
Lead	66N	96N	129N	22	2420	878
Mercury	--	0.030	0.030	0.050	0.460	--
NONVOLATILE METALS mg/kg						
Antimony	--	--	--	--	22	--
Barium	5.8B	43.4	19.2B	87.6	273	311
Cadmium	--	4	1.6	1.0	159	0.8
Chromium **	15	19	17	14	296	144
Copper	246*G	25*G	34*G	26	1590	42
Nickel	3.0B	6.0B	3.0B	14	146	6.0
Silver	--	--	--	--	2.5	--
Zinc	22*	130*	92.4*	80.7	2160	265

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

B (Organic) = Found in method blank.

D = Identified in an analysis at a secondary dilution factor.

G = Native analyte > 4 times spike added, therefore acceptance criteria do not apply.

J = Estimated value less than the sample quantitation limit, but greater than zero.

N = Spiked sample recovery not within control limits.

Z = Matrix interference; compound not positively identifiable.

* = Duplicate analysis not within control limits.

** = No distinction between Chromium (III) and Chromium (VI)

-- = Not detected

TABLE B-13

POSITIVE RESULTS IN SURFACE SOILS
DRMR YARD
DEFENSE DEPOT MEMPHIS TENNESSEE

PARAMETER	PHASE I					PHASE II
	SS1	SS2	SS3	SS4	SS5	SS41
PESTICIDES ug/kg						
4,4'-DDD	--	--	--	--	260	--
4,4'-DDE	--	290D	250	--	1100D	21
4,4'-DDT	--	1500D	1400D	--	5900D	130D
beta-BHC	--	--	--	--	--	10Z
Dieldrin	--	--	--	65D	--	--
Endosulfan sulfate	--	--	--	--	360	--
VOLATILE METALS mg/kg						
Arsenic	4*	18*	25*	33	20	--
Lead	66N	96N	120N	22	2420	67B
Mercury	--	0.030	0.030	0.050	0.460	--
NONVOLATILE METALS mg/kg						
Antimony	--	--	--	--	22	--
Barium	5.8B	43.4	18.2B	97.8	273	31.1
Cadmium	--	4	1.6	1.0	159	0.8
Chromium **	15	19	17	14	296	14.4
Copper	248*G	25*G	34*G	26	1590	42
Nickel	3.0B	6.0B	3.0B	14	146	6.0
Silver	--	--	--	--	2.5	--
Zinc	22*	130*	92.4*	80.7	2160	265

B (Inorganic) = Value less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detection Limit (IDL).

B (Organic) = Found in method blank.

D = Identified in an analysis at a secondary dilution factor.

G = Native analyte > 4 times spike added, therefore acceptance criteria do not apply.

J = Estimated value less than the sample quantitation limit, but greater than zero.

N = Spiked sample recovery not within control limits.

Z = Matrix interference; compound not positively identifiable.

* = Duplicate analysis not within control limits.

** = No discretion between Chromium (III) and Chromium (VI)

-- = Not detected

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